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## SECOND ANNUAL

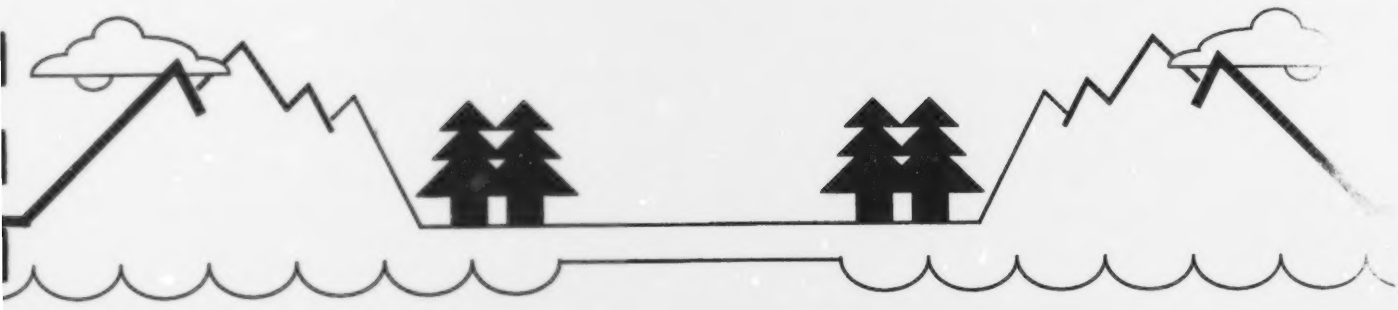
# ELECTRIC ENERGY

## FORUM

## Energy and the Environment

# PROCEEDINGS

May 10, 11, 12, 1989
Hotel Vancouver,
Vancouver, B.C.



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Jan. 1990

# Second Annual
# Electric Energy Forum

May 10, 11, & 12, 1989
Hotel Vancouver
Vancouver, B.C.

Sponsored by

**BChydro**

**B.C. Ministry of Energy, Mines and Petroleum Resources**
**B.C. Ministry of Environment**

Proceedings printed December 1989

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SECOND ANNUAL

# ELECTRIC ENERGY

FORUM

## Energy and the Environment

SUMMARY

# SUMMARY

Feedback from participants was the key ingredient of this year's Second Annual Electric Energy Forum, on 'Energy and the Environment'. Over 400 people came to Vancouver in May to discuss some of the difficult questions facing utilities today. How can Hydro meet the demand for more electrical energy in an age when the long-term negative effects of development are becoming increasingly evident on our environment?

A summary of the 20-year Resource Plan was released at the Forum. It explains that the Province of British Columbia will soon face important decisions regarding future power sources. Public consultation will play a critical part in determining what the mix of future energy sources should be. The Resource Plan forecasts that electrical growth will continue at a compound growth rate of about 2.8% annually, enough to double consumption in 25 years.

Power Smart programs will help to meet future demand. These are designed to reduce future demand growth by encouraging more efficient use of energy by Hydro's customers. Twenty-three Power Smart initiatives have been announced, which could free 2400 GW.h annually by the year 2000.

Other power sources include 'Resource Smart' programs to make existing generating facilities more efficient, and thus delay the need for construction of new plants. Other possible sources of new energy include purchases from Alcan and Alberta, and operational coordination with the Bonneville Power Administration; plus purchases from Independent Power Producers and from cogeneration resources in the forest industry. Together these programs could delay the need for new generation until 1995. Thereafter, major new hydroelectric or coal-fired thermal plants would be needed.

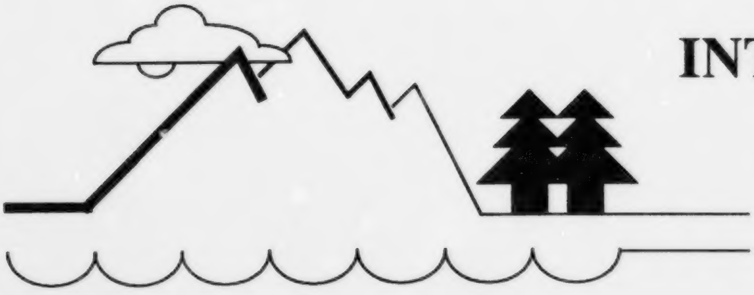
Speakers at the Forum addressed the United Nation's World Commission on Environment and Development Report on Sustainable Development (The Brundtland Report). Sustainable development means meeting the needs of the present without jeopardizing the ability of future generations to meet their own needs.

Chairman Larry Bell announced that Hydro has plans to increase environmental awareness among employees. "In our view, an environmental code of ethics cannot be imposed by senior management; it requires enlisting the active support of employees." Mr. Bell asked attendees of the Forum for comment and discussion of Hydro's draft environmental guidelines.

# ELECTRIC ENERGY

## FORUM

## Energy and the Environment



## INTRODUCTION AND KEYNOTE ADDRESS

# SECOND ANNUAL ELECTRIC ENERGY FORUM
THURSDAY, 11 MAY 1989
7:00 P.M.

## Introduction by Conference Chairman Don Swoboda:

Good evening Ladies and Gentlemen, my name is Don Swoboda and I am your conference Chairman. If any of you missed registration because we had a bit of difficulty in handling the in-rush of people, I should point out that we will look after you at the conclusion of the formal speech tonight.

I would like to start with just a few items which relate to questions that will be addressed to the speaker. In your package, for those of you who received one, there is a pale green form, with perforations and a number of question slips on it. If you have a question during the presentation please write it down and pass it to runners that will be available in the aisles to take the question to the front and it will be my task to present the question to the speaker. This is a format that we will follow through the Forum sessions, it will allow us to, hopefully, clearly present each question to all the people here tonight. Any of the questions that we are not able to answer with this process will be included later in the printed Forum Proceedings along with the answers to each question.

I will have a chance to say a few more words tomorrow at the opening of the program in the morning, I would now like to turn these proceedings over to Larry Bell, our chairman and C.E.O. at B. C. Hydro. Larry is the spark behind these Forums. This is the second Energy Forum we have held and I would now like to turn it over to Larry to introduce the keynote speaker for tonight's program.

# Introduction and Welcome

**Larry Bell**

**Chairman and Chief Executive Officer**

**B.C.Hydro**

## Welcome by Chairman of B. C. Hydro, Larry Bell:

Thank you very much Don, Good evening Ladies and Gentlemen and welcome. B. C. Hydro is pleased to be co-sponsoring this the Second Annual Electrical Energy Forum together with the Provincial Ministries of Energy, Mines, and Petroleum Resources and Environment. In my opening remarks tomorrow I will be saying more about our co-sponsors and about the conference theme.

Tonight we will be looking at the global picture and we are indeed fortunate to have as our keynote speaker a world citizen, a Canadian, and a veteran of our industry. Maurice Strong's extensive credentials are most impressive. Let me give you some of the highlights: he is chairman of Strovest Holdings Inc., located here in Vancouver and in Ottawa, the Baca Corporation, American Water Development, Denver Colorado, the World Economic Forum Council, Geneva, Switzerland; which I had the pleasure to attend earlier this year. He is a member of the International Advisory Board of Unisys; a director of Consolidated Press Holdings Limited and several other corporate boards. He is also president of the World Federation of United Nations Associations and of the Better World Society.

Mr. Strong has long standing ties with both the private and public sectors. He has received numerous international awards including honorary doctoral degrees from 27 Universities in Canada, the United States and Europe. Mr. Strong was recently a visiting professor at Edinburgh and York Universities. He is also a Fellow of the Royal Society of Arts, London England; a Fellow of the Royal Society of Canada, an officer of the Order of Canada and a recipient of the Tyler Ecology Award, and several other awards.

From December 1983 to December 1987, Mr. Strong was a member of the World Commission on Environment and Development, the "Brundtland Commission," and it is with this particular background that we have invited him to address this Forum on the subject of sustainable development. Ladies and Gentlemen, it gives me great pleasure to present your keynote speaker, Maurice Strong.

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# Sustainable Development

**Maurice Strong**
**Member of the U.N. World Commission**
**on Environment and Development**

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## Keynote Speech by Mr. Maurice Strong:

Thank you very much, Larry and Chairman Don, and all of you. I appreciate this welcome. I wish I could deserve all those nice things you have said about me. I look upon myself as a workman in the vineyard and I am particularly delighted to come back here to Vancouver and participate in the opening of this Energy Forum.

I am also delighted to see in the audience a good many people who are much more qualified to talk on energy than perhaps I am, although I will be modest enough to say that I have had some background in the energy business including one very unpopular company called PetroCanada. But it also includes, I have to say to you, Mr. Bell the Chairman of B. C. Hydro, an earlier episode in which the situation was reversed. I was then running the private corporation, Power Corporation of Canada, which was the major shareholder of the B. C. Power Corporation and its subsidiary, the B. C. Electric Company, which a very private enterprise government in this country nationalized. I had the job of negotiating with then Premier W.A.C. Bennett on that and on the voluntary acquisition by your great Authority of two other power companies, namely Northern British Columbia Power and East Kootenay Power.

So, I have been on both sides of the fence in the energy field. I can tell you that, for another reason, I am absolutely delighted to see that B. C. Hydro is taking the lead in convening these energy seminars and I do congratulate you, Larry, for that kind of leadership. It makes me feel that the assets over which I once had some influence are in very good hands. I am also delighted to see this report, which I hope everyone will take a look at, your 20 Year Resource Plan. We are going to be watching the evolution of this document to make sure that the environmental dimension gets even more attention in future than it does in this very good document.

Now my role tonight is to present the global context. Now that, of course, enables me to paint with a very broad brush and deal with the kind of vague generalities that sometimes have to accompany the global perspective. You know, as you rise above the globe the air gets thinner, even though the perspective may be a lot broader.

Now today, really, you cannot do any planning without a global perspective. Inter-dependance today is not just something to talk about, it is very real. Are any of you in the financial markets? I am sure you turn on your television or your radio to find out what happened in Tokyo and London before you phone your own broker. Your job prospects, the prospects for your products, and what you know about your weather depends to a very high degree on what happens elsewhere in the world.

So, the global context, when we discuss energy in British Columbia and Canada, is no longer just a frill, or something nice to talk about. It is, in fact, the real context in which you have to confront the relationship between environment and economy in this province. B. C. issues are inextricably linked to what happens at the global level. They are not only global in scale, they are systemic in nature in the sense that they are very intimately related. What happens in energy affects the economy, what happens in the economy is the prime determinant of the condition of the environment, the condition of the environment in turn is a basic resource on which economic development, as well as social well-being, depends.

You know we have divided this world into nation-states. But today we have to realize that the cause and effect system which determines the health, well-being and future prospects of every one of us, individually and in every state on this globe, does not respect those divisions which we have created. It is like drawing a ring around your ankle and decreeing anything that happens below that ring will not affect the rest of your body, then you step on a nail or you get a little pin-prick in your foot, and you know what that can do to the rest of your body. So, it is literally true that we live in a systemic world. We are just beginning to understand the implications of that, and I think that this is the subject matter that you will be addressing in far more detail in the next couple of days.

You should all bear that very much in mind, because energy is central to all of this, to the relationships between environment and economics, to sustainable development which is your theme for this conference. There is no question about it, energy is central, and it is central to the whole question of the transition that we are now faced with to sustainable development on a planetary level.

Let me give you a few words of history, because we also live in a space-time combination. Just as spatially the issues we are discussing are global in context, they also have to be seen within a time horizon. Human history has been based, of course, on the interaction between human beings and their natural environment. Largely, this history has been one of struggle by human beings to surmount the constraints and risks imposed by nature which have sometimes, as you know, been very cruel indeed. Since the Industrial Revolution, things have changed. Human beings have levers they never had before. Technology has given us massive levers and the result is, in this century, a history of greater change than in all the periods of history that preceded it and that change has accelerated during the last couple of decades.

Human population has increased from about 1.6 billion at the beginning of the century to five billion today. We passed that mark a few months ago. It will be six billion by the end of the century, more than three times the world population in 1900. However, human impacts upon our global life systems, resource base and environment have increased by a lot more than that. Those impacts have not come solely from increased numbers. Indeed, as the Brundtland Commission points out, human impacts, as measured by the increase in industrial activity, have increased by some 50 times or, as measured by energy use, by more than

30 times. So, while we were a little more than tripling human population, we have increased the rate of human impact on environment and resource systems by a factor of more than ten times that.

That has significantly changed the relationship between human beings and nature. Just as humans have been threatened by natural phenomena for so much of our history and we still have that syndrome in us, now nature is threatened by that acceleration of human impacts to the point where the human future itself, as the Brundtland Commission points out, is now threated by our own actions. We have reached the point in our history where we are literally in command of our own future. We are the architects of our own evolution and that is not something that is any longer optional to us. That is just a reality. Whether we wish to escape that reality or not, we cannot escape its implications. We are literally the determinants of our own future.

During the early 60's and 70's the evidence of those impacts, in terms of environmental degradation of various kinds, began to accumulate. We had "The Silent Spring", Rachael Carson's book, which alerted us. While her technology, her science may not have been perfect, her message was very well timed and basically correct. We also had the Stockholm Conference in 1972, at which I had the privilege of playing a part. That gathering was the first World Conference on a governmental level at which these issues were addressed. At that time it was perceived to be simply a pollution problem; a disease of the rich. The poor developing countries said "Look, if pollution is the cost of progress, we wouldn't mind having a little more of it."

That was the first reaction, but then there was a dawning awareness that the problems of the poor countries are also environmental at their roots. They have their roots in the fact that most developing countries depend for their prosperity on their natural resources; and these resources were being degraded; soil was being lost; that precious land was being desecrated by the march of the deserts; by salination and some of the results of badly managed or overly-intensive development.

Those problems had to be recognized by the rich as part of a global environmental issue, and they were. After Stockholm, we had an explosion of environmental activity and awareness. The creation of the United Nation's Environment Program, very underfunded, small in many ways, and yet, taking a real lead in dealing with the global and regional dimensions of environmental issues. The developing countries, instead being spectators and skeptics, decided that these issues were important to them. And virtually every developing country produced environmental policies, environmental legislation and some form of environmental administration.

The good news was that there was a response, at the level of policy, at the level of organization and even at the level of actually cleaning up pollution, reversing pollution in many notable cases. In fact, it was demonstrated in many cases that, where there was the political will and the concentration of effort and resources, many environmental issues could respond to treatment positively.

The bad news was that overall, as they began in the 1980's to survey what had happened since Stockholm, there had to be an admission that the total situation was worse on a global basis, despite these encouraging things. That is why, in 1983, the General Assembly of The United Nations decided to establish the World Commission on Environment and Development. They appointed Madame Gro Harlem Brundtland, previously Environment Minister, and then Prime Minister, and still Prime Minister of Norway, as its chairperson and that was a good choice. She is one great lady - in my view, one of the best and most promising of the new generation of international leaders.

For three years, that commission reached out to scientists, to public policy leaders, to citizens, to youth communities, to Native groups, all over the planet. We solicited their views, we talked with them. We sent people up to Moresby Island, under much disagreement, as I think you know, so I suppose I should not point any fingers. But we did this in Brazil too; we went to the Amazon. This World Commission basically cast its net more widely than any other in history; and after three years, we evaluated what we had found. Now our conclusions emerged in the report, "Our Common Future," that blue and white and red book: I wish I had it here to advertise it, but I hope it is going to be available in one of your displays. It is called "Our Common Future," and in a nutshell what we concluded was the following: that the survival of the human species, life as we know it, is indeed at risk. That, if we continue on our present course we cannot take our survival for granted.

That is a pretty sobering conclusion. Fortunately, it is not the only conclusion, because we also see a very positive future course for human life on this planet if we are able to change our ways. The key is the transition to sustainable development. No-growth is simply not a viable answer. You have four fifths of the people in the world just at the beginning stages of trying to lift themselves from the depths of poverty. Clearly no-growth is not a viable option. Even those countries which have been in the top of the growth league are not ready to abandon growth as an objective.

So, what is the answer? We have called it "Sustainable Development." It can be just empty rhetoric until we give meaning to it but, what is it? It is a synthesis between economics and environment, a recognition that it is indeed through the economic process that we impact on the environment. It is only by changing the nature and the dynamics of that economic process that we will be able to grow in ways that will permit us to continue that growth, and to do so on a basis that will not undermine the quality of human life. Now the report itself defines sustainable development as that which is designed to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. Or, put another way, a process of change in which the exploitation of resources, the direction of investments, the orientation of technological developments and institutional change are made consistent with future, as well as with present needs. Or more simply put, in my own words, economic growth which does not destroy or undermine the basis that our future growth and well-being depend. It is really saying, and anyone of you who run a business will understand, if you run your business without a depreciation and maintenance account, if you eat up your capital, you will be headed for bankruptcy. So, "Our Common Future" says very simply that Earth Incorporated has been living off its capital, has not been running a depreciation and amortization account, and is headed literally for bankruptcy. On a global level, the same cause and effect relationships exist that operate in our own lives and our own businesses.

A transition to sustainable development I would submit, is not an option, it is an imperative. It will be difficult, it will even be painful for some, maybe for all of us; but there will be more difficulty and pain for those who resist it, for those who fight it. That is the real difficulty, and it I would like in these next few minutes to tell you why I believe that.

There is another side to this, because sustainable development also opens up, in my view, great new opportunities for those who lead. Problems and difficulties, yes, and even pain for those who lag. But opportunities for those who lead. You know, knowledge is the prime resource. Knowledge applied through design, through marketing, through production processes, knowledge through information technologies, knowledge is the prime resource today. Knowledge is the prime source of new added value in our economy.

Every single sector of our economy is now a high-tech sector. You cannot say any longer that this is traditional and that is high-tech. Traditional sectors have to become technologically oriented. So knowledge is the prime resource, and we have to move from extracting value to adding value through the application of human knowledge. If knowledge is the prime resource; then poverty, inequity and injustice are the prime hurdles that we have to overcome on a global level.

The Third World, as I mentioned, will comprise four-fifths of the world's population by the end of the century. Four out of five of the people living on our planet are living in the developing world. In areas which have just started to benefit from the technological revolution, their highest aspiration is to grow, to simply add a little more to their prospects, to their own well-being; they cannot be denied that. The greatest potential market in the world, the greatest potential for reviving the world economy over a long period of time, for converting growth into a long-term phenomena again is by converting the needs of the developing countries, the vast unmet needs of the poor into markets.

That is one of the great challenges of the next century. This will produce competition in many areas that are familiar to us, but it will also produce immense new opportunities for us. We cannot run our planet, we cannot secure our future on this planet, without the cooperation of that four-fifths of the world. We have to bring them in, we have to make them partners in this process, and they have to see that partnership is based on their getting an equitable share of the benefits of the technological civilization, as well as joining with us in caring for its future and ensuring that future. We cannot look at them in environmental terms and say, "Look, we are concerned with your exploding populations," and "Look, China and Brazil, we are concerned about your greater use of coal. We are concerned about you cutting down the Amazon Forests and we want you to stop in the interest of the world." We cannot say that. In reality, it is the developed nations that are pouring most of the pollutants into the atmosphere. We are the ones that are really creating the global problems, the ozone depletion and the accumulation of greenhouse gases in the atmosphere that is affecting climate, through our levels of energy use. We are the ones who benefited most from the industrial revolution, we are the ones who are contributing most to those environmental problems that actually constitute, at this time, a threat to our future. We simply cannot say to them, "Don't do what we do, do what we think is good for us, whatever it may cost you." That just won't work.

Now energy, as you know, is the key to growth. If you take a look at energy use over the years and you draw a graph of energy use and economic growth you will find that they are almost in parallel. Industrial activity and economic growth have largely been related to energy use and energy conversion. There has been a skewing of that relationship in recent times and I will come to that in a minute.

We have today a dilemma in the energy field, and it is central to our capacity to make the transition to sustainable development. That dilemma is that we have plentiful reserves for the forseeable future, at least in fossil fuels. Oil and gas, you know, will not last for hundreds of years; but for the next century oil and gas are bound to play a part in the energy mix. I think they have reached a peak in terms of their total percentage of energy use. If you look at fossil fuels as a whole, there are still vast untapped reserves of coal; coal is the expansion element in terms of fossil fuels. There will not likely be an expansion in the share of oil and gas in the energy mix, but a major expansion in the use of coal is expected unless we do something about it. Of course, we have nuclear power. But each of today's energy sources which are prime sources in our energy mix have very important environmental constraints. The World Commission on Environment and Development concluded in its report that no environmentally sound, or economically viable energy pathway to our future is currently available. That is a very awesome challenge.

We face, however, a major energy transition. We have to make that transition and it is the key to our ability to make the larger transition to sustainable development. There is one possibility for the future and which we have been seeing on the television. They are arguing whether or not this possibility, cold fusion, has actually occurred. We do not know the answer to that yet, we do not know if it has occurred or if it can occur. We do know a couple of things; one is that it would open an immense new opportunity for clean energy that could meet both environmental and demand needs. With fusion, one cubic kilometer of sea water would be equivalent to the amount of energy in all known oil reserves in the world. If you look at Einstein's equation, $E=MC^2$, obviously energy is the most abundant thing in the universe. It is a question of usable energy which is economic. In theory, solar energy is virtually infinite too, but the ability to convert solar in ways that are usable has not reached and is not likely to reach economic levels in the foreseeable future. Maybe solar will be our principal source of energy in the more distant future. Biomass is also a very good source in many ways, but it also has some constraints.

The important thing is how useful these energy sources will be in terms of meeting our future energy needs. It will take some time before they become big sources of energy. At best it might take 20 or 30 years, even if fusion was available today. The estimates range between 20 and 40 years until it would be able to take its place commercially as a very major source of energy. So, we face a transition.

In the meantime we cannot continue increasing our rate of fossil fuel use at the current levels. There is no question that we have to constrain our use of fossil fuels and particularly we have to change the mix of fossil fuels. We are within the planning horizons of major corporations like B. C. Hydro. When we are talking 20 years, we are within an existing corporate planning cycle for a major energy organization.

So, the easiest and most economic way is, of course, energy conservation. Indeed, it is something like seven times more cost-effective than any other form of energy generation. Whether the figure is seven or not, energy conservation clearly makes the most economic and environmental sense. Of course, you know that the U. S. and Canada both use about twice as much energy per capita as Japan and Western Europe. Yet, as you know, these countries have standards of living at least as high as ours. Japan may even exceed us in per-capita income. What this demonstrates is that it is entirely possible to use much less energy without reducing economic efficiency or standard of living. Western Europe and Japan use only half as much energy per unit of industrial output or G.D.P. as the U. S. I don't have the figure for Canada but, I am sure that it's comparable. That shows that reducing energy use by conservation is entirely compatible with economic growth.

Oil and gas will have to be regarded as transitional fuels too. They pollute the environment but, and I am going to come to that in a second, we are not going to be able to phase out oil and gas use for some time. We can constrain it, change the mix, but we are not going to be able to phase them out for the next couple of decades or more. In fact, oil, gas and coal will have a place in our economy as at least feedstocks until the reserves are exhausted.

Next, we have nuclear. The World Commission on Environment and Development also expressed some real doubts about nuclear. In fact, it said, that although it does regard nuclear as a possible future source, it would not be acceptable unless the environmental, waste disposal and safety factors can be dealt with much more effectively than they are now. A distinguished panel of scientists that I heard recently in Davos, Switzerland said, "Look, whatever you think, you are going to have to revisit the nuclear issue." We will simply have to look at nuclear again, at least in a transitional way. So, we are going to hear that view and we are going to have to deal with that view.

In the developing countries, the transition is from firewood to liquid fuels. Trees are now being cut in Africa ten times faster than they are being grown. Do you know that more people rely on wood fuel for their energy than on any other source of energy? Wood is not the largest source of energy, but more people rely on wood for fuel than any other fuel. This will have to change, they must move to liquid fuels. In my view, natural gas holds a key transitional role for global energy because gas contributes much less than coal and somewhat less than oil to the greenhouse effect.

In the last 15 years, total global energy use has increased 46 percent and in the next 15 years it is very likely to increase by at least as much, even if you allow for some progress in energy efficiency and conservation. Today, on a global basis, 97 percent of all industrial energy comes from fossil fuels and that will have to change. Clearly, that energy transition is imperative. Even if fossil fuel use remained constrained; if we were able to keep it at present levels, scientists tell us we would reach the limit of carbon dioxide concentration in about 30 years, well before fossil fuel reserves run out. So, even staying at present levels of fossil fuel use is fraught with danger.

No scientist can be precise about these things but, I submit it is just like a doctor examining you. If he tells you that you have a high level of cholesterol, and you are pointing to a real danger of a heart attack, you usually do something about it or at least you should. Well, that is what we are being told, the scientists cannot be certain, but we cannot wait until a post-mortem to see if they were right or not.

There are major differences in fossil fuels. Coal is the worst in environmental terms, and yet coal is the resource that many developing countries are planning to develop to meet their new energy needs. India and China are gearing up for major coal use. Petroleum oil is better, but natural gas is best amongst the fossil fuels. If all of today's fossil fuel use was gas, sulphur dioxide emissions, for example, would have been one third lower, acid rain correspondingly reduced and little more than half of the CO2 would have been generated when compared with coal. There are significant environmental advantages in switching to gas. We would buy some time. It would not solve the problems, but it would enable the level of emissions of CO2 into the atmosphere to be reduced. Within the fossil fuel mix, we will have to move more and more to gas and that means something for B. C. and its planning.

The International Institute For Applied Systems Analysis recently released an energy scenario for Europe in which it indicated that it would be to Europe's advantage to replace significant coal and oil with natural gas. It is quite easy for them to move to gas, and to give gas some 30 percent of the market share for energy. It would result in a reduction of oil imports by 20 percent and reduce the market share of energy from oil from 60 percent to 25 percent by the early part of the next century. It would also considerably lower their present reliance on nuclear.

You can see that there are geo-political implications to this proposal. The interesting thing is that this move would come by increasing European reliance on Soviet gas. That has security implications, but in the new political climate of relationships between western and eastern Europe there is a very real chance that it could be done. Therefore, the energy scenarios in Europe may be very different than we thought. They will have a corresponding impact on world energy scenarios. They would have major impact on reliance on OPEC oil. They would have a major impact on the degree of interdependance between western and eastern Europe and that would have profound implications upon N.A.T.O. and world security. So you can see how these energy issues will involve a whole set of relationships on our planet and they will do the same at the community level.

Overall, let me say that electricity will clearly remain the prime conversion media. It is important to remind ourselves that electricity, while it is the handiest, the most convenient means of receiving the energy we use, it is not an energy source in itself. It is simply a conversion medium and in my view it will remain the principle one.

In the liquid fuels area, there will be a major change in the conversion medium. I believe there will be a major movement to the hydrogen economy. Hydrogen is also not an original source but rather a medium and I have to tell you that I had a very exciting experience this afternoon. I went out to a Vancouver company, Ballard Technology, and they have developed fuel cells using hydrogen, using air or liquid hydrogen or liquid hydrogen and oxygen or water. You can use any one of those and believe me, what they have done impressed me and I am sure you are going to hear a lot more about it. I am not trying to advertise it, I don't have any shares in it or anything else. But it just demonstrates that right here in this community, you are really doing some world class work in energy terms and that is exciting. There is no question that hydrogen is going to have a major role as an alternative to fossil fuels in the transportation area. So, while electricity is going to stay as the major medium, I believe that for motor vehicles, gas and oil will be replaced gradually by non-fossil liquid fuels of which hydrogen is the prime prospect.

Canadian leadership, I think, is absolutely feasible in this area. I think we have a great leadership opportunity, I believe also we have great vulnerability. We have a vulnerability of not changing, we are pretty soft you know, we always think we grew up in a harsh climate and that makes us tough. That was so in my father's generation when we grew up through the depression etc., and maybe in our grandfather's generation. It is not so true now. We are pretty darn soft because we have relied on our extractive industries. We have relied on our natural resources. Now we are in danger of lagging, but we don't have to lag because we have leadership in Canada, the kind of leadership you are seeing in this conference. But we are highly vulnerable.

Canadian leadership was, I can say very proudly, very much in evidence in the follow-up of the Brundtland report. You can be proud of your federal government; I know less actually about what you have done out here, but I hope if you are not yet on-side that you will be. You know that the Canadian government formed this National Task Force on Environment and the Economy immediately following the Brundtland Commission. It came out with national strategies and these were real, they involved corporate leaders, environmental leaders, citizen leaders, and there were government ministers, both provincial and federal; and as a result they recently formed a National Round Table on the Environment at the federal level, with the Prime Minister, Finance Minister, and Environment Minister; and that is entirely in line with the Brundtland recommendations. They formed provincial round tables in most provinces by now and there are a whole series of initiatives springing up in this country.

At the moment, we are ahead of the game in terms of creating discussion, setting up meetings like this, in rhetoric and talk; politicians now feel it necessary to display their environmental credentials. I met with Mrs. Thatcher about a week ago in London and had a very good private discussion with her on this subject. That would have been unthinkable a few years ago. She is a chemist, a tough lady, she has seen the evidence and that has convinced her. Mrs. Thatcher is really convinced that the climate change issue is the most important issue facing human kind.

As for our own Prime Minister, I am delighted to see the kinds of things he is saying. He is setting a very high standard for his performance and I am sure he will live up to that standard and we are all going to hold him to it. I think the most encouraging thing is the International Centre For Sustainable Development that he announced before the world at the General Assembly last September. He said that Canada was going to establish in Manitoba, an International Centre for Sustainable Development, that it would be a leader, not only in Canada, but around the world. We are waiting to see how this announcement is going to be followed up. I think we have a window for opportunity. For reasons you know about we are acceptable abroad. We are liked abroad, so we have the elements of leadership in this field. That leadership can stimulate a tremendous amount of pride for Canadians, for the survivability of individual Canadians and also for our economy. Temporarily, we have a window of opportunity, but it won't last long.

I have just returned from Japan, too. Japan has not announced any world development or economic environment centre. But, I can tell you, that they are farther ahead in planning it than we are. They have not made an announcement at the United Nations. They have not announced it even in Japan, but when I went there at the request of their top people, not just subordinates, but top people in Mitsui and Mitsubishi, they said we want your help and guidance in forming an international body on sustainable development. I cannot tell you much more, but I can tell you they have seen in their own economy that it is not only possible, but profitable, to combine economic advantage with sustainable development. They have reduced the energy and materials content of their gross domestic product in ten years by 40 percent and they have done it while growing at much greater rates than any other major industrial country in the world. They have seen that sustainable development works economically. They see that it's the next generation of competitive advantage, it's where the future lies.

So, we in Canada, have a window of opportunity, but it is not enough to announce things, it is not enough to talk about them; we have got to do them! Sustainable development, in my view, is the wave of the future. The only choice we have as Canadians is: will we be on the leading edge of that wave, or will we be caught in its backlash? With this conference, when I looked at the list of your speakers, when I looked at its sponsorship, it was quite clear to me that there is a wave of commitment, a wave of interest, a wave of enthusiasm and we have the advantages I have mentioned. But believe me, the world is moving fast in this area. Canada must not miss that window of opportunity and this meeting gives me a great shot of adrenaline in thinking that we are on the move in Canada and let's hope that out of this conference comes, not only some nice polite exchanges of views and speeches like mine, but a commitment to action. You have the ingredients here, you have some outstanding people here and I am looking forward to the dialogue that we can now initiate. I look forward to the opportunity of meeting many of you in the informal session that follows. Thank you.

Questions Directed to Mr. Strong:

Mr. Bell:

Maurice Strong has agreed to answer a few questions. Perhaps, I can read out one or two of these, and as Don Swoboda indicated, we will provide a written answer in the Proceedings to all of the questions that we receive. The first question is: "Please elaborate on your statement, that CO2 levels will reach unacceptable levels in 30 years."

Maurice Strong:

My reference for that is a study just released by the International Institute For Applied Systems Analysis. It is subject to challenge obviously because there are assumptions related to it. The point really is not so much whether it is 30, 25, or 50 years; the point is that we cannot simply wait to deal with the need to reduce the fossil fuels component of our energy mix. That is the key point, I will neither defend or argue with the number, I don't think the basic premise, is disputable.

Mr. Bell:

The next question is: Is B. C. Hydro practising sustainable development when it invites proposals to burn coal to produce power for export when it has hydro power undeveloped?

Maurice Strong:

I cannot believe that you are doing that.

Mr. Bell:

I think the key word is we have invited proposals for generation and some of the proponents have proposed coal-fired thermal....

I didn't want the Vancouver Sun to think I was going to duck that question so I put it on the top. Here is a key one, Maurice. "How can the developing countries find energy to meet the needs for their growth?"

Maurice Strong:

I am very glad that that came up because one of the problems with even a long speech like mine is that it's short in terms of trying to cover the subject. When I talked recently I mentioned Mrs. Thatcher but I also saw Lord Young and Lord Young is the British Minister of Industry, who was present at Davos.

In talking about what Britain is going to do he said, "Look, we are going to have to decrease our CO2 emissions use by at least 50 percent and we can do it. It is going to be tough but we are going to do it." I am waiting to see them do it and it is very important that the Minister of Industry was saying it. "But," he says, "We have calculated that once we do that, once we reduce our CO2 emissions use by 50 percent it will be equivalent of eight days a year of increased Chinese use of coal."

Well that really highlights it. The Chinese have coal; they are relying it for their energy future. What are we going to do? We cannot tell them to stop, but what we have to do is help them get access to the latest technologies and alternative energy sources that will reduce the emissions. You can't take the CO2 out of coal, but you can do some things to reduce its impact. More particularly, we have to make sure that we share the technologies and the resources with them that will permit them to have access to other less offensive energy sources. That is not going to be easy. I am part of a study group that is trying to get a handle on the boundary conditions, on the limits to the amount of greenhouse gases that can be put in the atmosphere, and then we will work back from that.

When I quoted 30 years; even at present levels that may or may not be correct but, we do need to get a fix on that limit and make the best estimate we can. Then we will know the upper limits, the boundaries that we cannot transgress. We will have to agree on how we share the allowable emissions, the necessary reductions and the commitment to reducing emissions. That means that most of the reduction has to come from us; part of that reduction will have to be in quotas to the developing countries, so they can increase their fossil fuel use while we are all moving to an economy with almost no fossil fuels. It is going to have to be done in that fashion, I think.

Mr. Bell:

Maurice, perhaps I can ask a supplemental question. The meeting in Davos was extraordinarly impressive, in the sense that you had world leaders there who focussed on these issues and had a commonality of interest in solving them. "Can we go beyond that, beyond those individuals to institutions that will see this happen within the time frame of the challenge?"

Maurice Strong:

I think so, as a matter of fact, one of the things I would hope this new Centre for Sustainable Development will do in Canada or something somebody will do, is to sit down with industry and challenge them.

Challenge them to develop a sustainable development strategy for their own industry because sustainable development conceptionally is easy to explain, but is much tougher to do what we have to do and that is translate it into very specific sectoral components, programs, policies - how to do it.

I have met with the head of an ammonia plant in Brandon, Manitoba, my home area. They had responded to a challenge to see what they could do on the environment. They did not call it sustainable development at that stage and the manager of that plant told me how amazed and delighted they were that when they really got into it. They not only found a tremendous number of areas where they could reduce their energy use and their environmental impacts, but they could also do it at a profit.

Not all of it can be done at a profit, but when you do get people with that kind of leadership committed, if sectors and individual companies can be challenged to develop a strategy, two things will happen. They know how to apply the concepts to their own business better than anybody; no government or anybody else can tell them to do it better. You challenge them to do it, but then they are going to find areas where they can do it economically. They are going to find other areas where they are not going to be able to do it without some changes in government policy or the incentive system. That is going to come up and they will say, "Well look, we can do this, but only if we have a different set of government regulations or policies." So, that process is important, the process of having every industry, every company, every entity like yours looking at their strategy and coming up with what they are doing, and what help they may need in terms of different policies and regulations to do it. I would like to get to the point where every individual does his own sustainable development impact statement.

## Thanks to Maurice Strong by Chairman Larry Bell:

I was going to direct one more question to you but, I think that your last answer forms an excellent conclusion to this address and to the questions.

Well, Ladies and Gentlemen, Maurice has not only very ably outlined the challenge, but he has left us with an admonishment, which focuses on us as individuals and I think that it is something that we all must think about. Maurice referred to Madame Brundtland as a world citizen. I have had one or two opportunities, in different Forums, where I have formulated in my mind what I think is a definition of a world citizen. A world citizen is one of those rare people of talent, interest, and energy whose thoughts and actions transcend sovereignty in the service of us all. Maurice, we are proud of you, as our world citizen. When I approached Maurice in Switzerland in a crowded hallway and asked him if he would consider coming here, he agreed without hesitation. It was with an eagerness to come back to his home to talk to Canadians and to carry the message.

I would like to thank you very much, first for your service, and then for taking time out of an extraordinarily busy schedule to come and talk to us today. As a token of our appreciation, we have a small gift for you. I can well imagine that you must already have a warehouse of similar gifts in your back yard, but we were not going to let you leave without providing you with an appropriate gesture to emphasize our very sincere thanks to you for your message. Thank you Maurice, very much.

# QUESTIONS ANSWERED BY MR. STRONG AFTER THE FORUM

Question:

"Low pollution technology frequently costs more and may consume more energy. How do we change the attitudes of business?"

Mr. Strong:

Well, we'll have to do it through education and maybe legislation. But if industry realizes that it is going to have to change its emission policies, I'm confident they will come up with innovative ways of achieving reduced pollution, maybe even at a profit.

Question:

"Why were all major Canadian environmental advocacy groups, Greenpeace, Pollution Probe, Friends of the Earth excluded from the Federal Round Table?"

Question by: Colin Isaacs, M. Sawyer

Mr. Strong:

I believe the intention was to involve individuals who could review the problems with no pre-determined positions. It is to be a consensus group, not a confrontation Forum.

Question:

"How does the World Commission on Environment and Development regard hydroelectric generation and does it see limits to the number or percent of rivers we can dam?"

Question by: Peter Rowlands (Friends of the Stikine)

Mr. Strong:

I think the Brundtland Commission recognized hydroelectric generation as one of the least-polluting sources of electricity, but world-wide hydroelectric is limited. There simply isn't enough hydroelectric left to develop. The big sites have severe environmental problems. The Chinese are having second thoughts about their Three Gorges project which would require a million people to be relocated, and in Brazil there have been demonstrations from the Indian people against some of the sites in the Amazon Basin being considered for hydroelectric development.

Question:

"Please comment on how third world countries can improve their environment in the short run - example, Mexico City is a mess, how do you address this?"

Mr. Strong:

Well, we can't tell them to stop burning coal and stop driving automobiles in Mexico City. That won't work. Maybe they can pipe in natural gas and maybe some day they can run their vehicles on natural gas or hydrogen. But if you're a poor farm worker in Mexico, life in Mexico City, with all its drawbacks, looks better than life on the farm. So they keep moving to the Capital. I think there are 20 million people in Mexico City nowadays, and the population keeps climbing, despite earthquakes. They have a real problem down there.

Question:

"What advice can you provide to industry, to participate in sustainable development while remaining competitive?"

Mr. Strong:

Well, I think it's a matter of being clever; of innovation. If you can think of a process for turning an existing pollutant into a saleable product, you'll laugh all the way to the bank. Look at Cominco - they turned an SO2 emission problem at Trail into a profitable fertilizer industry. Maybe other industries can do the same.

Question:

"Will world population have to be controlled to reduce energy demand?"

Mr. Strong:

The world population simply cannot keep doubling every 30 years. There is an upper limit. Maybe Malthus will prove right in the end. Now, population in the developed Western countries is levelling off. Maybe when the Third World reaches a level of prosperity at which larger families are a detriment rather than an asset, family sizes will level off. But we can reduce the pollution from energy production by many means other than population control. The Chinese are trying to limit population growth. I don't think it is a very popular program there.

Question:

"So much depends on how the U.S., Japan, the U.K. and other major industrial powers react to the concept of sustainable development. How are they reacting? What progress can you report from them? What would you consider to be encouraging/discouraging signs in Japan and the U.K.?

Will it take a crisis to turn us around - how far away are we from controlling the increase in CO2 emissions?"

Mr. Strong:

Now that's a lot of questions. In my talk I spoke of support by Japan, the U.K. and Canada for the concept of sustainable growth. It will come; it will have to come. I told you of my contacts in Japan who are already planning on how to achieve more sustainable growth. Next, will it take a crisis to turn us around? I hope not. I think we will be able to see the handwriting on the wall and address the problem before it comes to that. Now the greenhouse effect and the ozone depletion effect are gradual, very gradual. But scientists assure us that all that CO2 will eventually have an impact on climate. The effect may be a few degrees increase in global temperature. So, I am sure we will have to make a major global effort to reduce CO2 emissions, or at least to reduce the rate of increase in CO2 emissions. No one said it would be easy.

Question:

"With solar cell efficiencies rising and production costs lowering, and with fossil fuel prices rising, why do you think that the solar age is still rather distant?"

Question by: Bob Sherwood, Environment Canada

Mr. Strong:

You can't wave a magic wand to make solar cells competitive with, say, hydroelectric generation today. But as the supply of oil and gas grows scarce, the price of new electric supplies will eventually reach the point where solar energy will become commonplace. California is doing a lot of research and development work on very large solar generation plants. It makes sense in the sunny climate down there and I'm sure it will be a very important source of energy in the future.

Question:

"How can the developing countries find the energy to meet their needs for growth and won't increased fuel wood and hydrocarbon use further complicate our greenhouse effect?"

Question by: Dr. Patrick Duffy

Mr. Strong:

Yes certainly. That's the problem. All I can suggest is that they should try to develop all the natural gas they can find. The wood fuel won't last in the Third World. They will have to do something, and soon.

Question:

"In view of Chernobyl and dead lakes and rivers of Poland can we say that communist regimes are worse environmental offenders? Is forgiveness of loans to Brazil or Poland in exchange for some "conservation dollars" we might save, worth considering for taxpayers in Canada?"

Question by: Mark Jaworski

Mr. Strong:

No. On a per-capita basis, we in North America are the worst offenders in terms of tonnes of CO2 and amount of acid rain generated. Forgiveness of loans to Brazil is a bookkeeping transaction amongst the banks. What they need is better prices for their raw materials; for coffee, for copper. Reducing the amount of Amazon forest burned each year by loan write-offs won't put any food on the table for the people of the Third World.

Question:

"Does a 30 percent reliance on Soviet natural gas not place western Europe in an extremely dangerous strategic position?"

Question by: D. A. England, B. C. Hydro

Mr. Strong:

Well, it is certainly a consideration. But not long ago Europe relied on OPEC for nearly all of their petroleum supplies. And they survived that. Trade is a two-way street. The foreign exchange which the U.S.S.R. would earn from gas exports would mean they would be able to improve the standard of living of the average Soviet citizen. I don't think that's necessarily a bad thing for international stability.

Question:

"Based on your statement that the use of fossil fuels is detrimental to the environment, is it appropriate for B. C. Hydro to request proposals for development of coal/fossil fuel generating stations with our abundance of potential hydro power?"

Question by: Neil M. Nielsen

Mr. Strong:

I don't live in British Columbia. I don't know the answer. But I can guess that by calling for expressions of interest for power development, B. C. Hydro is just trying to keep all the options open. A relatively small thermal plant with full scrubbers may be seen by people living in, say, the Peace River Valley, as a reasonable alternative to the Site C Project. Any new coal-fired plant would have to pass all of the environmental regulations I'm sure.

Question:

"Isn't natural gas most "valuable" as a chemical feedstock? Is it wise to "spend" that value to marginally effect CO2 emissions? Isn't it better to:

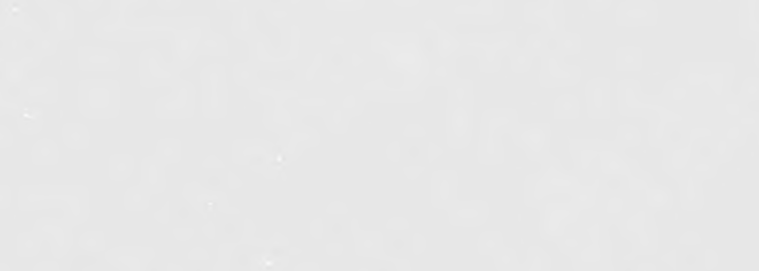
1. conserve;
2. clean up coal combustion."

Mr. Strong:

Well, you're right, natural gas is a valuable chemical feedstock. But what do you do if you live in Nepal and the wood you need each day to cook with is now 1000 feet up the hill? What do you do when this forest is all cut down? So yes, we must conserve and clean up coal combustion and try to limit world population; all of these things. But the people of Nepal may have to shift to bottled gas or piped gas in the near future.

# ELECTRIC ENERGY
FORUM

## Energy and the Environment



## SESSION I: ISSUES AND ALTERNATIVES

# SECTION 3

# SECOND ANNUAL ELECTRIC ENERGY FORUM

## "ENERGY AND THE ENVIRONMENT"

THURSDAY 11 MAY 1989
8:30 A.M.

## SESSION 1: ISSUES AND ALTERNATIVES

WELCOME FROM MR. DON SWOBODA, CONFERENCE CHAIRMAN

INTRODUCTORY REMARKS, MR. LARRY BELL, CHAIRMAN, B. C. HYDRO

FORUM ORGANIZATION AND INTRODUCTION OF THE HONOURABLE MR. JAKE EPP

* 'A CANADIAN GOVERNMENT PERSPECTIVE': THE HONOURABLE JAKE EPP
QUESTIONS DIRECTED TO MR. JAKE EPP

* 'ELECTRICITY A STRATEGIC RESOURCE': THE HONOURABLE JACK DAVIS
QUESTIONS DIRECTED TO DR. JACK DAVIS

* 'RECOGNIZING THE VALUE OF WATER RESOURCES': DR. PETER PEARSE
QUESTIONS DIRECTED TO DR. PETER PEARSE

* 'U. S. NORTHWEST ENERGY AND ENVIRONMENT ISSUES': MR. JIM JURA
QUESTIONS DIRECTED TO MR. JURA

# Forum Organization

**Don Swoboda**

**Vice-President of Production**

**B.C.Hydro**

# SECOND ANNUAL ELECTRIC ENERGY FORUM
## THURSDAY, 11 MAY 1989, 8:30 A.M.

### Welcome from Mr. Don Swoboda, Conference Chairman:

Good morning Ladies and Gentlemen and welcome to the Energy Forum, day two. For those of you who are visitors to the West Coast and to Vancouver it is a great day to be inside at a Forum rather then enjoying our typically nice wet West Coast weather. I understand that the weather will improve, and hopefully some of you will be able to stay for the weekend and enjoy the hospitality of the West Coast.

I would like to make a few announcements. One is in response to a question that has been asked by a number of people, "What about a list of the registrants?" We have at the registration desk about 30 copies of the list to date. By about noon, we will have a more complete list of all the registrants because there has been some registrations that has taken place this morning. For those of you who would like an early copy, there are some at the registration desk. We will announce when the more complete list arrives.

The discussion leaders, who have been identified, are asked to attend a meeting in the Garibaldi Room at the end of the corridor on this floor in which there will be a briefing for the workshop sessions to be held this afternoon and tomorrow morning, and that meeting will be held during the coffee break this morning.

There will be a no-host reception at 5:30 this evening for some socializing and debriefing with your collegues. The reception will be at the registration desk area, at 5:30 this afternoon.

A bulletin board has been established beside the information desk and messages will be posted. Only those that are of an emergency nature will be announced to keep that process to a minimum. I ask that you please check that message board periodically during the course of the proceedings. If any of you have had any problems with meal tickets in your registration packages, or have not been assigned a workshop table designation card, a color card for your session, I ask that you please check with the registration desk to get that matter clarified before the workshop sessions proceed this afternoon.

Maurice Strong, in his delivery last night, made reference to a book, "On Our Common Future", a publication of the World Economic Commission on the Development and the Environment. We have managed to secure a copy and we have it, for your reference, at the information desk and copies of it are available for purchase from a bookstore, "Duthie Books", just around the corner.

The speakers are asked that they allow enough time at the conclusion of their formal presentation for questions and we suggest an allowance in the order of five to ten minutes be made. If you wish to ask a question, you are again asked to write out your question onto the pale green tear sheet in your registration package. When you fill those out, pass them to the end of your aisle where we will have people circulating to collect those slips of paper and pass them to the front. They will be read out to the audience, so that the speaker can then respond. Those questions, as I mentioned last night, that we have not answered in the time allotted in the program will be addressed in the written Proceedings for the Forum, a copy of which will be mailed to all registrants after the session.

I would now like to open the formal Proceedings with a presentation by our Chairman, but first, a few words of introduction. Larry Bell is the chairman and C.E.O. of B. C. Hydro, a role he has fulfilled for about two years. He comes to that role with extensive experience in both the financial and the public sector. Prior to be his appointment to B. C. Hydro, he spent three years with Vancouver City Credit Union. In addition, he was involved as the Provincial Deputy Minister role of Finance, as Deputy Minister in Lands, Parks, and Housing, and also as Deputy Minister responsible for Transit. He has a Bachelor's Degree in Economics and Geography from U.B.C. and a Master's Degree in Social Science from San Jose State College. He is a member of the Institute of Research on Public Policy, vice-chairman of the Vancouver Board of Trade, member of the Canadian National Committee World Energy Conference and is the General Campaign Chairman for the Lower Mainland United Way Program in 1989.

As I mentioned last night, our speaker is the spark behind these Energy Forums, this being our second Electric Energy Forum; and it is a great pleasure to introduce Larry Bell, who will give the opening introductory remarks. Mr. Larry Bell.

# Opening Remarks

**Larry Bell**

**Chairman and Chief Executive Officer**

**B.C.Hydro**

## Opening Remarks: Mr. Larry Bell, Chairman B. C. Hydro:

Thank you very much Don. Good morning, Ladies and Gentlemen and a a special welcome to those of you who unfortunately could not hear Maurice Strong's very inspiring presentation of the global issues that face us in the context of energy, energy for the world.

This, our second Forum, has been developed around four objectives. The first was very ably done by Maurice last evening when he reviewed global and regional environmental issues. Secondly, we want to present future alternative resource scenarios for your consideration. Thirdly, we will take this opportunity to introduce, for your consideration and critical comment, B. C. Hydro's proposed environmental guidelines. Fourthly, and most importantly, we want to provide the basis for a representative debate about environmental and resource development trade-offs.

We greatly appreciate the co-sponsorship of this Forum by the Provincial Ministries of Energy, Mines and Petroleum Resources and the Environment. The Honourable Jack Davis, Minister of Energy, Mines, and Petroleum Resources and the Honourable Bruce Strachan, Minister of the Environment will both be addressing you later in this Forum. I want, as well, to thank our many distinguished speakers for their participation in this Forum. Many of them have travelled some significant distance and taken time from their very busy schedules.

This morning I have two tasks, the first is to report on B. C. Hydro's activities since the last Forum. The second is to comment and introduce the agenda for the next two days.

Well, let me start by reporting to you. First of all, during the last year B. C. Hydro has undergone significant structural changes. The privatization of our gas and rail operations has allowed B. C. Hydro to provide a sharper focus in terms of dealing with its primary task, the efficient supply of electricity. In addition, we have created a number of subsidiary companies which will provide for the more efficient use of a number of specialist resources for the benefit of B. C. Hydro, its customers and the economy of the Province.

Those of you who attended our last annual Forum may recall that I announced then that we would be issuing a number of proposal calls to provide independent power producers with the ability to supply electricity for both our domestic market and for export. With the benefit of your comments from last year, we greatly improved our proposal call documents. You will pleased to know that the response has been extensive and right now we are involved in the evaluation process. Indeed the extensiveness of the response has placed an extra burden on us in terms of evaluation. The largest proposal call was for 600 MW for the export market. This resulted in 17 expressions of interest for a total of 4400 MW of capacity. When you consider that our existing system has roughly 10 000 MW of capacity it puts that response into perspective. The proposals are many and varied, and include both thermal, with refuse coal, geothermal, natural gas and waste wood; and hydro.

Our proposal call for the 150 MW to serve the domestic market closed on May 1. We received expressions of interest for 19 projects, with a total capacity in excess of 1100 MW. We are just delighted with the response. It is beyond our expectations. The technical and financial capability of the proponents are undoubted, and so we look forward to negotiation and the conclusion of contracts. On the domestic side, we expect to re-issue the proposal call; we see the prospect of doing that for a number of years.

A second major initiative that was announced last year was demand-side management. Many of us had trouble with term demand-side management. It is very difficult term, particularly in a speech. So this has evolved into our Power Smart Program, which is much easier to understand. As many of you will know, we launched Power Smart in mid-March and we plan to spend 225 million dollars over the next 10 years in order to realize annual energy savings in the order of 3000 GW.h, or over half the annual output of a Site C. Bob Crockett, our Manager of Marketing, will be reporting to you on this program in detail; as will Wayne Morgan with respect to independent power producers.

I am delighted to report that we already have a number of major successes with respect to the Power Smart Program. We found, much to our surprise that one of the greatest opportunities in corporate British Columbia for saving energy was, guess where? B. C. Hydro. Just to give you one small illustration. We have replaced all of our fluorescent light tubes in our head office. It cost us $55,000 and we are saving $44,000 a year in energy. This is just one example of the multitude of opportunities that are very simple and straightforward, not high-tech, not high-risk, but that are open to all of us in our homes, plants or places of work. On the basis of preliminary returns from our various Power Smart Programs, it is costing us less than half of our projected budget to obtain these savings. Truly, conservation is the least expensive source of energy in this province. To date, over the last year, we have run a few pilot programs and we have captured some opportunities where industrial retrofits were taking place. With the momentum from our launch earlier this year, we have saved 11 million kW.h per year already, and this is enough electricity to serve the residential requirements of Fort Nelson, just to put these numbers and terms into perspective for you.

I am truly confident that next year at our Forum, we will be announcing a significantly larger Power Smart program. We are confident that we can raise our sights, that we can count on greater success in partnership with you. These more ambitious targets can be put into our resource plan with confidence.

Well, let me now move to our agenda. First, Ken Peterson, our Manager of Policy and Planning, will be describing our latest forecasts and some of the possible alternatives in terms of resource strategies for meeting these forecasts. The plans will be presented in the context of alternative scenarios, rather than fixed views of the future. In the past, the debate has often centred on load forecasts and I want to stress and urge upon you that while forecasts are important, they mainly affect the timing of decisions, but it is the resource decisions themselves that we need to focus on. Those are the important decisions. We must talk about their impacts on the environment. We will have some difficult resource choices to make in the next couple of years, both in terms of providing adequate electrical energy to the turn of the century and beyond. It is essential, given that necessity, that we explore together all of the economically and environmentally feasible options. That is a burden, an important burden placed on all of us.

As many of you know, of course, our current Resource Plan, which takes us through to the turn of the century, involves five key strategies and these are roughly ranked by cost and environmental impact. First; Power Smart - end use efficiency which is the cheapest, best and most attractive energy source. Next, Resource Smart - the dynamics of this program in B. C. Hydro are very interesting. Did you think that the engineers that built one of the best hydro systems in the world were going to stand by and let the marketing people take all the limelight? No way! "Resource Smart" emerged. When challenged, people become very creative, and our System Development Group put together a package on supply-side efficiency. The basic question was, "If we enhanced our maintenance, if we incrementally added to the capital on existing plants, could we get more energy on a cost-effective basis?" The answer was, "Yes," and the list of initiatives is extraordinarily impressive, so that is our second strategy. Thirdly, there are obvious opportunities to coordinate with our neighbours, with BPA to the south and Alberta to the east. These are very significant opportunities to help each other, simply by agreeing to coordinate our activities. When I say that, simply, I do not mean to say that it is a simple process; but the concept is straight-forward. Fourth, of course, is the independent power producers, the IPPs, and many of the proposals we have received from the IPPs will, in fact, help us deal with existing environmental problems, including an early initiative in Williams Lake with respect to wood waste. I am delighted to see the Mayor of Williams Lake here again this year. We have, perhaps 10 or 12 projects being considered which involve wood wastes. So, at present we have a waste disposal problem. We have a fly ash problem, we are obviously contributing to CO2 and we need some way of dealing with this waste issue. Can we minimize the impact on the environment by providing facilities that are much more benign with respect to the impact on our atmosphere and at the same time use that energy? Well, the answer is "yes." We are greatly encouraged at the level of activity and interest. In addition, of course, a number of our pulp mills which do not have co-generation today are considering adding that type of facility to their plant. We are greatly heartened with those kinds of proposals. Lastly, we are proceeding on a contingency basis with putting ourselves in a position where we can collapse the lead time for the building of a conventional generating facility.

An integral, but sometimes forgotten aspect of resource planning, is transmission. It is a key strategic resource. It is absolutely vital to efficient resource use and in providing good service to our customers. Efficient use, because it allows electrical energy to be transferred efficiently and, of course, it provides for the backup that enhances the quality of our service to our customers. We in B. C. Hydro see that building the necessary transmission is going to be as difficult a challenge as building new generating resources. Perhaps in the near term, it will be our most difficult task. When I say that, I mean that we have a challenge in front of us in terms of discussing the alternatives of evaluating the impacts and determining what we wish to achieve by way of service to our economy and what we are willing to accept by way of environmental impacts.

An emerging issue related to transmission construction is the associated electric and magnetic fields and their possible health effects. We are monitoring this issue very closely; some months ago we engaged one of North America's leading scientists to advise us on this topic and I hope some of you will have an opportunity to discuss this issue further in one of our workshops.

Speaking of the workshops, let me now turn to your assignment. You thought that you were coming here to sit and listen; but, I am sorry, there is some work for you to do. At our first Forum we felt that it had too much one-way B. C. Hydro communication. We did get some good feedback in terms of improving our contractual proposal for independent power producers, but we would like more feedback. So we have allocated a total of five hours in this Forum for participation and workshops, two hours this afternoon and three hours tomorrow morning. In these workshops, you will have an opportunity to discuss various topics on generation and transmission. The workshops will be run by experienced facilitators and we encourage you to contribute to a lively and constructive airing of all views. Feedback from these workshops will be summarized tomorrow and a more extensive summmary will be included in the Forum proceedings.

Before I conclude let me say a few words about our theme - the environment. We want to tell you a little bit about what we have done at B. C. Hydro. We take pride in some of our partial successes, the multiple use of reservoirs, the destruction of PCBs, our vegetation management program. However, we are not complacent. We are not satisfied and we are endeavoring to improve and do more. I am pleased today to announce that Chris Boatman, who is the Vice-President of Corporate Affairs, will assume, in addition, Vice-Presidential responsibility for all environmental issues. This appointment reinforces our commitment to the environment and reflects the commitment of not only senior management, but indeed, B. C. Hydro's Board of Directors.

Chris will be discussing our draft environmental guidelines this afternoon and we will be inviting your comments on them in the workshops. We have spent a good deal of time and effort talking to many corporations throughout North America and we have tried to pick from the very best and then improve on it. We hope that you will contribute to that process in the next two days. I would like to stress that it is our view that an environmental code of ethics for an organization cannot be decreed by senior management or imposed by the board of directors. In my view, it requires enlisting the active involvement of all employees. We have conducted a number of employee focus group discussions to allow employee consultation on the guidelines. I can tell you that the response has been overwhelming. The ability to participate in developing these guidelines is viewed by the employees involved as one of the more significant things that has occurred to them in the workplace. It is our goal to empower all of our employees to think and consider the environment in their daily work and to feel free, in fact to feel obliged, to offer suggestions on how we might improve. It is traditional to think of the environmental challenge in B. C. Hydro as the impact of a dam and a reservoir but, of course, it goes well beyond that, and indeed we have opportunities corporately to compensate where we must consume part of the environment in serving our mandate. This includes those who set specifications for purchasing: Is that container biodegradable? For those who deal with the recycling of our waste: What do we do with our oils from our garages or from our diesel stations? What do we do in terms of managing our reservoirs? These are questions, and indeed decisions, that hundreds upon hundreds of employees make everyday and we want them to make these decisions in the context of our environmental guidelines.

In conclusion, we are faced with the challenge of balancing the needs of a growing economy with its potential impacts on the environment. I approach this topic with a naive optimism that says anything is possible. We just have to ask ourselves, Is it practical?, Is it acceptable to our fellow citizens? There are no absolutes, just trade-offs, trade-offs over time. Maurice Strong talked about this very difficult period of transition. Because we have asked them in a systematic way for two years, we know that the citizens of British Columbia are prepared to make sacrifices with respect to incomes and convenience in order to realize environmental goals. They told us this last year and they were even stronger with respect to their conviction this year. The question is, to what degree? The other question is, of course, are a few going to be asked to make that sacrifice for many? What we really want from this Forum, from your contribution to the workshops, is your opinions with respect to these trade-offs. Thank you very much for coming and I hope that you find the next two days informative and constructive.

# A Canadian Government Perspective

**The Honourable Jake Epp**

**Member of Parliament for Provencher and**

**Minister of Energy, Mines and Resources Canada**

Introduction of Mr. Jake Epp by Conference Chairman Mr. Don Swoboda:

Thank you very much Larry for those most encouraging and stimulating introductory remarks for today's session. When Larry asked me to chair these proceedings, I was pleased to volunteer, because I consider that the issues of energy and the environment are vital issues to all of us. As a production person and an engineer, I have the task of ensuring that the system operates in a manner that protects the environment and maintains reliable service. Sometimes it is not easy. It requires sacrifices, such as a reduction in the hydro generation to protect fish stocks or a curtailment at Burrard thermal output to reduce air quality impacts. I will not go into detail here. I will leave that to the other speakers. But I do look forward to talking to many of you about these issues, and, as Larry has indicated, receiving your input over the course of this Forum.

The question we must address at this Forum is, "How can we do a better job in protecting the environment for future generations, while serving our customers reliably and economically?" In developing a response to this question, we heard last night from Maurice Strong and he told us, "No-growth is not a viable option, and the key is in the process for transition to a sustainable development." As Maurice said, "We are the architects of our own evolution and our future" and certainly those are most challenging words and these words, I think, should ring in our ears as we deliberate and consider the issues before us over these next two days.

I will say no more, and get on with the pleasurable task of introducing one of our key speakers to this Forum. A gentleman who will give us the perspective of the Canadian Government on these most important issues of energy and the environment, the Honourable Jake Epp. Mr. Epp is a Member of the Cabinet Committees of Planning and Priorities, Cultural Affairs and National Identity, Economic Policy and Environment. Mr. Epp has been Minister of Indian and Northern Affairs and Minister of National Health and Welfare prior to his present appointment. Mr. Epp has a Bachelor's Degree in Arts and another in Education, and he was a teacher and active in community groups before entering politics. I ask you to join with me in offering a warm West Coast welcome to Mr. Jake Epp, the Federal Minister of Energy, Mines and Resources, who will give us the Canadian Government's perspective on these issues, Mr. Jake Epp.

NOTES FOR A SPEECH

BY

THE HONOURABLE JAKE EPP
MEMBER OF PARLIAMENT FOR PROVENCHER AND
MINISTER OF ENERGY, MINES AND RESOURCES CANADA
TO
B.C. HYDRO'S
SECOND ANNUAL ENERGY FORUM
"ENERGY AND THE ENVIRONMENT"

VANCOUVER, BRITISH COLUMBIA
MAY 11, 1989

# PLAN

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2. Background and Government Objective
3. Energy and the Environment: Find the Balance
4. The Scope of the Environmental Problem
5. The Role of the Federal Government
6. Provincial and Industrial Response
7. Looking Ahead
8. Conclusion

## 1. Introduction

Good morning, ladies and gentlemen. I want to thank you very much for inviting me to speak to you. It's always a pleasure to be in British Columbia, and I'm especially pleased to talk about a subject of particular interest to myself and the people of this province: energy and the environment.

## 2. Background and Government Objective

I have assumed the energy portfolio at a very challenging time -- a time when the demonstrated success of this government's energy policy encourages extra effort in the work that remains to be done. In the light of this success, we plan to continue to pursue a market-based energy policy. We want to get out of industry's way. Much has already been accomplished in deregulating oil and gas. High on my agenda is the deregulation of electricity exports.

The purpose of the electricity export deregulation policy is to reduce duplication. Normally it should be unnecessary for both the provinces and the National Energy Board to regulate electricity exports and international transmission lines.

Under the new electricity policy, exports and international power lines will continue to require authorization by the federal government. However, these authorizations will normally not require a public hearing by the National Energy Board.

In exceptional cases, however, federal authorization will require a public hearing. This is most likely to occur in cases where provincial regulation is deemed to be insufficient - for example, in cases where the sponsoring province has not complied with relevant federal environmental guidelines.

The new electricity policy also extends the maximum term of export licences from 25 years to 30 years. This should make it easier to finance large new electricity generation and transmission projects. At the same time, it will prevent exports from being permanently alienated from Canada.

These changes will be effected through amendments to the National Energy Board Act. The Department of Justice is now drafting the bill, which I plan to introduce as soon as it is ready.

## 3. Energy and the Environment: Finding the Balance

Deregulation doesn't mean that the federal government has abandoned its commitment to a healthy environment. Our children deserve high living standards and a clean environment. Our task is to ensure that they inherit both.

The challenge that we all face is to avoid putting an unacceptable strain on the environment while at the same time ensuring that Canada's electricity supply system is adequate to meet economic and energy objectives.

We are headed in the right direction. But we can only succeed if your industry, governments, and the public work together effectively.

## 4. The Scope of the Environmental Problem

The first question to ask is - which environmental issues are most important? The quick answer is - all of them. But today I think it is obviously appropriate to address myself primarily to the environmental impacts of electricity generation.

All electricity generation projects have some effect on the environment. The burning of fossil fuels tends to cause acid rain and contributes to the greenhouse effect. Nuclear energy raises concerns about the disposal of radioactive wastes.

It is fair to say that none of the conventional sources of electricity generation are without environmental problems.

## 5. The Role of the Federal Government

At present, the federal government is pursuing a number of measures that will reduce the adverse environmental impacts associated with electricity generation. Let me give you a few examples.

First of all, we are continuing to support alternative energy and demand-side management. If we can reduce the demand for electricity, we will obviously lessen the total environmental impact associated with meeting that demand. And if we could develop ways of generating electricity that are environmentally benign, we could eliminate the adverse environmental impacts altogether.

But it is unrealistic to expect that demand-side management and alternative energy will solve the whole problem. So we also have to reduce the adverse environmental impacts associated with conventional sources of generation.

We have been a leader in formulating international protocols to reduce sulphur dioxide and nitrogen oxide emissions. Both of these pollutants contribute to acid rain. Nitrogen oxide causes low-level ozone damage as well.

Here in Canada, we have developed a comprehensive agreement with the eastern provincial governments to cut sulphur dioxide emissions in half by 1994.

In 1986, responding to the recommendations of the Brundtland Commission, we created a National Task Force on Environment and Economy. As a first step toward environmentally benign development, the task force recommended establishing national and provincial roundtables comprised of all stakeholders, including the public.

With regard to global warming, the federal government hosted the Toronto Conference on the Changing Atmosphere. Shortly afterwards, federal, provincial, and territorial energy ministers formed a task force to review the results of the conference and to recommend government action.

## 6. Provincial and Industrial Response

The federal government isn't the only party involved in these efforts. And here I'd like to take a moment to recognize what you -- the industry and the provinces -- are doing to improve the environment.

I must say I'm particularly heartened by the work being done in British Columbia. This province has taken steps to ensure that energy development will proceed without putting undue stress on the environment. The Energy Project Certification Process, in particular, ensure that environmental issues are addressed in the planning of major energy projects.

The province is also cultivating new sources of energy through B.C. Hydro's Independent Power Production initiatives. This form of power development can result in reduced environmental impacts, particularly when cogeneration, small hydro, and alternative energy forms are exploited.

On the demand side, too, B.C. Hydro is moving to help take the pressure off the environment. B.C. Hydro's Power Smart program has elevated Hydro to one of the leaders among Canadian electrical utilities in the are of demand-side management.

I am particularly interested in your efforts to diversify energy supplies through inter-provincial trade opportunities. The effort that B.C. Hydro and TransAlta have made in assessing the benefits to be gained by coordinating B.C.'s hydro-based generation system with the coal-fired system used in Alberta is work that I believe can be emulated in other parts of the country.

The B.C. and Alberta systems are complementary, and the study undertaken by the two utilities documented the economic and operating efficiencies that can be achieved by coordinating their operation. The coordination of generation expansion can result in reduced reserve margins, increased diversity in generation, displacement of uneconomic and environmentally toxic generation, and the avoidance of crisis-oriented development decisions when higher-than-forecast load growth is experienced.

We are hopeful that these kinds of benefits can be realized all across the country. To this end, I have asked the National Energy Board to identify measures that would enhance interprovincial electrical trade, encourage greater cooperation between utilities in systems development, and enable power to be wheeled across interconnected provinces.

The Board will be commencing its work this summer, and the Board's Chairman has advised me that he intends to consult with industry and the provinces as he proceeds. I concur fully with this approach. Obviously, progress in this area will be impossible without the support of the primary decision-makers.

## 7. Looking Ahead

But a great deal more needs to be done. To ensure that we continue to have one of the world's highest living standards, we will need to increase dramatically the amount of electricity we generate. To a certain extent, of course, we will become more efficient in the way we use electrical energy. And, with luck and effort, we will increasingly be able to make use of environmentally benign energy sources.

Even so, over the next 25 to 30 years, Canada will probably have to double its present electrical generating capacity. Barring a major new breakthrough, such as the one we may be witnessing with regard to cold nuclear fusion, most of this increase will have to be provided by large conventional sources of generation: hydro, coal, or nuclear.

The challenge we face is to ensure that we generate this enormous amount of additional energy without putting an unacceptable strain on the environment. This means that standards and guidelines must be established to impose environmental norms on electricity generation and transmission.

One key element of the federal government's electricity policy will therefore be to ensure that rigorous guidelines are developed to reduce the adverse environmental impacts associated with electricity generation projects. The Government of Canada will seek to develop such guidelines, in cooperation with the provinces, the electrical industry, and the public. The goal will be to achieve a nationwide consensus on environmental norms, while providing flexibility on how these are to be adapted to local circumstances and on how they are to be achieved.

Almost all electricity generation systems are either wholly or partially within provincial jurisdiction. It is therefore the provinces which, in the first instance, should ensure that environmental impact analyses are carried out. For projects falling within its own jurisdiction, the Government of Canada will carry out its own assessments, in a manner designed to complement what work may have already been done by the provinces and utilities.

The above plan will not be easy to implement. But the effort must be made. The Canadian electrical industry must in the future become as successful at environmental protection as its has been in the past at providing reliable service at minimum cost.

## 8. Conclusion

My approach, as I hope I've made clear, is to create a framework in which industry, the public, and the various levels of government can cooperate to achieve shared objectives.

I believe this can happen. We are all stakeholders in the environment, just as we are all users of energy. All of us want economic prosperity, just as all of us want cleaner air, lakes, and rivers. For these reasons, I'm certain that if we're only willing to work a bit harder together, to go that last mile, we will achieve our goals. In so doing, we will create a Canada that is economically strong, technologically innovative, and environmentally sound.

## Thanks to the Honourable Jake Epp by Mr. Doug Horswill, Deputy Minister of the Provincial Ministry of Energy, Mines, and Petroleum Resources:

Minister, ladies, and gentlemen it is a great honour and pleasure as one of the co-sponsors to be able to thank Minister Epp for being with us today and participating in this very important Forum.

It is especially pleasing to have a Minister of Energy from a riding just west of the geographic centre of this country. I think we look forward to you, sir, being able to balance not only issues like the environment and energy, and projects important to us such as Vancouver Island pipelines, but also being able to balance issues of west and east and you couldn't be better positioned to do it.

We thank you very much for your inspiring remarks today, I personally look forward to working with you and with your staff. I know Mr. Davis, my minister, does as well, as we continue down the road toward responsible development, toward a combination of energy and environment and concerns of the future, of our economic growth and the benefits to Canada from that kind of development. Thank you Mr. Epp.

## QUESTIONS DIRECTED TO THE HONOURABLE JAKE EPP

Don Swoboda:

I have a number of questions I would like to direct to the Honourable Jake Epp. There is one issue that seems to have attracted a fair number of questions and maybe I can start with that. I will read out a couple of these questions to give their flavour. "How is closing 12 regional Energy, Mines and Resources Renewable Energy offices consistent with your support of alternative energy and demand-side management?"; "You said that the government supports demand-side management, so why did you close the renewable energy branches and why did the federal government's budget eliminate E.M.R. conservation and energy programs?" There is another one like that and it raises a second issue. "What is the budget or what funds are being made available for Refuse-derived Fuels, Municipal Solid Waste, and Energy from Waste projects at Energy Mines and Resources?"

Jake Epp:

The reasons for closing the 12 Conservation and Renewable Energy Offices, or CREOs, are straightforward.

The CREOs were established under the National Energy Program of 1980 to deliver conservation and renewable energy programs. Many of their activities - for example, the Canadian Home Insulation Program - have since either been phased out or successfully shifted to the private sector. Maintaining these offices can no longer be justified in a period of fiscal restraint.

The remaining research, development and demonstration programs in the areas of energy conservation and renewable energy can be more effectively and efficiently managed from Ottawa.

In respect to the budget, we will be spending $49 million on energy efficiency and diversity (EED) programs in fiscal 89/90.

Don Swoboda:

"Will your government directly support provincial utilities in developing energy efficiency programs for consumers in the immediate future?"

Jake Epp:

Decisions on programs which will be undertaken in these areas rest first and foremost with utilities and the provincial governments. If we can cooperate, we will, but I think the initiatives will come from the utilities. Our participation will be more along the lines of research, development and information. The demand side management inventory we recently undertook with the Canadian Electrical Association is an example of our activity.

Don Swoboda:

"You state Canada is promoting conservation and demand-side management, and the National Research Council wants to be a world leader in these areas and yet they have been cut back; why?"

Jake Epp:

If you take a look at the entire package of research and development, the Government of Canada has increased spending in science and technology R&D.

But we always face critical decisions on whether programs created in the past are still to the greatest benefit. We rely to a large extent on peer review. I do not think that because something has existed for a long period of time it has automatic validity. We will continue our work in R&D and basic science but if programs can be transferred to the private sector, they will be.

Don Swoboda:

"What is the current or Federal budget for energy conservation, demand side management and alternative energy supply? How does this compare to recent previous years i.e. what are funding trends?"

Question by: Bill Best

Jake Epp:

As I indicated, the program budget for fiscal 89-90 is $49 million. It is anticipated funding will remain roughly at that level for the foreseeable future. Obviously, this level is considerably lower than spending in previous years. The difference reflects both a change in emphasis away from grants and subsidies to cost-shared programs, and our determination to reduce the federal deficit.

Don Swoboda:

"What will your departments focus be in regards to Demand Side Management?"

Question by: Laverne Dalgleish, National Energy Conservation
Association.

Jake Epp:

We'll continue our research and development work at EMR. But each area of the country has slightly different requirements for their electric energy conservation programs. So it's appropriate that the utilities work with their provincial governments to develop the programs they want. If we can cooperate, we will. But the primary responsibility rests with the utilities.

Don Swoboda:

"Isn't the federal government placing too much emphasis on markets in the case of energy, considering that energy markets are replete with both market failures (natural monopolies, externalities, common property resource issues, imperfect information, etc. etc.) and government failures? How would you compensate for such failures and more importantly under a "laissez-faire" policy, how would you ever recognize such problems?"

Question by: Timo Makinen, SFU

Jake Epp:

It is a complete misunderstanding to characterize Canadian energy policy as one of "laissez-faire". We are placing greater reliance on market forces and we are working at reducing regulations found to be no longer necessary.

However, we do recognize that there are many areas of energy production, transmission and marketing that continue to require regulation. The construction of natural gas pipelines is just one example.

In addition, the Government of Canada stands ready to respond if it appears that energy markets are not working or are not fully taking into account social costs and benefits.

We are fortunate in Canada in having a mix of energy supply options including natural gas and nuclear which have minimal or no impact on the greenhouse effect. At the same time we must recognize that our geography, the vastness of our country, and our industrial structure make us an energy intensive country. It is fair to say it's latitude, not attitude, that makes us large energy consumers.

Our challenge is to learn how to use our vast energy resources in a manner consistent with our economic and environmental objectives.

Don Swoboda:

"How can you reconcile the right of the public to know, with elimination of public hearings by the National Energy Board?"

Jake Epp:

We are not eliminating public hearings. We are simply trying to eliminate duplication and streamline the process.

Don Swoboda:

"Why not attack the problem of reducing SO2 emissions from Ontario Thermal Power plants by substituting low sulphur B.C. and Alberta coal for high sulphur U.S. coals?"

Question by: M.A. Thomas, Chairman B.C. Chamber of Commerce, EMPR Committee.

Jake Epp:

We are doing just that. The Western Economic Diversification initiative administers a fund to cost-share with the Western provinces and Ontario ways to move low-sulphur coal eastward in a cost-effective way.

Don Swoboda:

"Which entities, government or private sector, will be primarily responsible for building additional electric transmission facilities connecting the U.S. and Canada?"

Jake Epp:

As you know, in order to get transmission lines built across either interprovincial or international borders, you need National Energy Board approval. We are working to reduce overlap and duplication between federal and provincial jurisdictions. I expect that electricity exports will continue to be initiated and implemented by utilities.

## ADDITIONAL QUESTIONS FOR THE HONOURABLE JAKE EPP ANSWERED AFTER THE FORUM

Question:

"The Brundtland Report said the energy consumption of developed nations, i.e. Canada, must reduce, not increase, as you suggest. Does Canada back the Brundtland Report or not? What measures will Canada take to reduce demand?"

Jake Epp:

As did other countries, Canada made great strides in energy management over the last decade. Although we continue to make modest gains in efficiency it is clear that new innovative measures will be needed.

We are fortunate in Canada in having a mix of energy supply options including natural gas and nuclear which have minimal or no impact on the greenhouse effect. At the same time we must recognize that our geography, the vastness of our country, and our industrial structure make us an energy intensive country. It is fair to say it's latitude, not attitude, that makes us large energy consumers.

Our challenge is to learn how to use our vast energy resources in a manner consistent with our economics and environmental objectives.

Question:

"Is there a federal policy addressing priorities and trade-offs between coal thermal power and conventional nuclear alternatives?"

Question by: Carl Hunter

Jake Epp:

Not at this time, to my knowledge.

Question:

"Our basic decision to be driven by a "market-based energy economy" presents us with a challenge to understand what drives the market. Would you agree that we currently have a very poor understanding of market issues, especially how it can be influenced by business, government and the media, both in positive and negative ways? May our lack of understanding make us too much dependent on market forces, a short-sighted approach?"

Question by: Julian Taylor

Jake Epp:

Well, I'd say the market-based economy is very good at reacting to short-term energy price trends. Maybe when it comes to broad policy decisions we have to rely on informed citizens, who learn about future issues at Forums like this, to tell politicians like us where we should be heading.

# Electricity as a Strategic Resource

The Honourable Jack Davis, Minister

Energy, Mines and Petroleum Resources

Province of British Columbia

Introduction by Mr. Don Swoboda, Conference Chairman:

Our next speaker is a man who really needs no introduction; particularly at a Forum of this nature talking about the subject of energy. But I will give you a brief introduction anyway. The Honourable Jack Davis is an engineer, an economist, a former Member of Parliament as our previous speaker mentioned, and is currently a Minister of the B. C. cabinet, the Minister of Energy, Mines and Petroleum Resources. He is also a member of B. C. Hydro's Board of Directors. Federally, he has served as Minister of Fisheries, and Forestry and Minister of the Environment. Provincially, he has been Minister of Transportation and Communications as well as Minister of Energy; before being appointed to his present position. Dr. Davis is on the Environment and Land use Committee and other committees of the B. C. cabinet.

In 1975 he was chosen as Canada's Engineer of the Year and during his formal education days he was a Rhodes Scholar, and of course he is also an author of a number of books. It is a great deal of pleasure to me to welcome, on your behalf, B. C.'s Minister of Energy, Mines and Petroleum Resources, Dr. Jack Davis; who will give us the perspective of electricity as a strategic resource; Jack Davis.

# ELECTRICITY AS A STRATEGIC RESOURCE

THE HONOURABLE JACK DAVIS, MINISTER
ENERGY MINES AND PETROLEUM RESOURCES
PROVINCE OF BRITISH COLUMBIA

Jack Davis:

Thank you Mr. Chairman, you and the others who have organized this gathering are to be complemented I gather there are at least 400 registered perhaps 450 by later today which must set a record in itself. It indicates obviously the interest not only in power but also in the environment. Indeed we are all, in varying degrees, environmentalists these days. I noticed that most Ministers of Energy now talk more about environment than they do about energy. The Honourable Jake Epp comes about it honestly, because he was previously the Minister for Health and Welfare and he certainly has a background which suits him well to his present Cabinet position.

Marcel Masse, the minister before him, in the latter stages of his period as Minister of Energy, Mines and Resources in Ottawa was making speeches much more about the environment than about energy. There is another reason for this, because federally, and to quite an extent provincially, we have been deregulating the energy industries. With deregulation the market works more effectively, and the private sector and the other levels of government have more say. The private sector does provide much of the initiative especially in the commodities industry like coal, oil, and to some extent natural gas.

We have a greater problem, I think, on the electrical side than obtain with respect to those other energy commodities. The problem is essentially this. Electricity, while it may not be a free resource, is a very low-priced resource. It is priced well below its real market value, so it is often used wastefully. It is used because of its abundance at a low price. This comes about because electricity is a utility industry, a regulated industry, it's an industry which is regulated so that its price approximates cost, not value, in the market place. Cost plus a reasonable rate of return, but not a highly profitable rate of return, such as might have occurred if we had a free market in the electricity.

We have electricity available at exceptionally low prices, especially in this country and increasingly in this province. While B. C.'s electricity price, if I can put it that way, was about average for Canada for many years, it's now declining relative to the prices in other provinces. Or to put it another way, our energy rates are not going up as rapidly as those in the rest of Canada and indeed in the rest of North America. Our rates are now ranked in the lowest ten percent, if one is talking of North-America wide. So, we have a greater problem in this sense that electricity, while is not a free good in this province, it is abundant and it is available at a very low price, price related to cost. Now this fact does in itself tend to generate environmental problems. We use electricity wastefully.

It has tended to create constitutional problems too. In the early 1980's the federal government finance ministry became enamoured with the idea that low cost electricity, especially in certain provinces, was a resource; an advantage to those provinces and should also be taken into account in our federal-provincial relations. Oil was caught up in the federal program for spreading the wealth. Electricity has not been, but that study showed that if we had to go to some alternative source of electricity in this province; (Maurice Strong is here, can I mention coal?) If we had to go to coal, our costs would be much higher, our rates would be much higher, so we had an economic rent. You and I as consumers in this province were enjoying some kind of windfall because we had low-cost Hydro. So each province in varying degrees had an economic rent and British Columbian's economic rent was immense and it was felt that this should be taken into account. We were a "have" province, so we should contribute more to the rest of the country. Quebec likewise, I mention Quebec, and that is the main reason the Feds did not begin to recognize the economic rent on electricity to spread it across the country.

So while Alberta got hammered on oil; we escaped, because Quebec also escaped from this imaginative levy which would be used in calculations for spreading the wealth across Canada.

Well, we have one low-cost source of energy in this province, electricity. Natural gas is also our other major resource and environmentally, like Hydro, it is comparatively clean, so we do have two major advantages. Now, British Columbia observed the federal exercise and that was the reason, as far as I can determine, why B. C. brought in the water rental levy. Here was a low-cost resource, a low-priced resource: it could stand a tax, indeed it already stands taxes such as property taxes and so on.

But it can stand this exceptional tax so British Columbia, unlike other provinces, even levies a substantial water rental tax on a major electro-process firm which might add 15, even 20, percent to the cost of its electricity. This is a special tax levied by the province. Now we might also have had one federally, as well but so far we only have it provincially; and it's a tax which the industry seems to be bearing reasonably well, because our rates are still low and our costs are still low. But I want to again emphasize the fact that we have this extremely low-priced resource which invites misuse. B. C. Hydro today pays all the property taxes that other domestic industries pay, unlike most other electrical utilities in Canada. It also pays this water rental fee, its going to be paying for all of the environmental costs and indeed I think it is already paying most of them for its developments.

We can afford this because this, low-priced resource, this low-cost resource, generates so much rent, if I can put it that way, for the people of the province. Now, on the natural gas side, we are using new terminology. There is the core market, made up of the little people and then there is the rest, which are few in number, who are the major users of gas. These are the electro-process industries, pulp and paper, and so on.

The core market is dependant on regulation to protect if from price increases. It gets its service at cost. The rest, the relatively few process industries on the gas side, are now free to shop around. They can go to the field and buy their own gas. They can have it brought down or wheeled at the carriers' regulated cost. So we have two markets, one is the core market; residential, commercial, and most industrial; the other is the large industries. Now if one divides the electricity market in the same way there are the small dependant users where electricity is a very small percentage of cost say one or two percent of their costs. For them, it doesn't really matter that much whether power or prices double; it is still a small item of cost, even if there were this price increase. They are favored because they have very low prices, but still the price of electricity is not crucial. Electricity prices are not crucial to their location decisions. I will still continue to live on the North shore whether the electricity price is today's price or twice that. Within reason, I could afford to pay that.

But in the other market, the large electro-process industries, electricity is a very important item of cost. Those industries are few in number. They are the Cominco smelters at Trail, the aluminium operations at Kitimat; that type of industry, and to a considerable extent the pulp and paper industry, particularly the new process industries which are more power-intensive. Their electricity costs may be 10 or 15, 25, or even more percent of their total cost of doing business and those industries have always tended to go where electricity was (a) low in price and (b) the supply could be guaranteed over a period of literally decades.

We had that kind of industry come to this province in the very early years, such as Cominco at Trail and later Alcan. We have had very little development along those lines electro-process lines in the interval when Hydro was the principal supplier, but now that we have deregulation, we are inviting the private sector to develop unique sites and use the power locally. We may well see more electro-processors come to British Columbia. We are also developing a process for wheeling, whereby private or other developers can not only develop a site locally, hopefully at low cost; but then can sell their power to a new industry at a distance by wheeling the energy through Hydro's system. But Hydro, of course, has to be kept whole in the process. It has to be new industry and Hydro has to be kept whole.

On the export side, there are possibilities, but British Columbia has never been a major exporter of electricity in its history. Unlike Manitoba currently, unlike Quebec, certainly unlike Ontario; there have not been one-way deliveries of power from B. C. into the United States, locked in for decades at a time. We have sold surpluses on a very short-term or spot basis as it suited us. Admittedly, you get a low price for a surplus that cannot be stored but can only be sold, and is only available for a relatively short period of time.

We have therefore never financed a project in this province based in a large part on export sales. We have built our power plants for our own needs now and in the future, we have not built plants to serve customers in another province or in the United States with power contracts providing the financing of the project. We are looking at that possibility, the possibility of a project being built which would be tied to an export sale for a decade or two or three. The Honourable Minister Jake Epp said, "they are prepared in Ottawa to look at contracts for export sales up to 30 years." Clearly energy sold for that length of time would have to be surplus to our needs. The project would stand or fall dependant on the export contract, the export price, and the longevity of the contract and it would be privately financed, not publicly financed, because it would be a private venture, It would not be a development funded by you and I as tax-payers.

But to stress it again, it has to be surplus energy to British Columbia and to Canada, the National Energy Board would insist on that; and the price received would have to be more than enough to finance the project and carry it through its lifetime. Now, sales of electricity in this country, in the main, have been at cost; regulated cost; cost plus a minimal profit just enough to attract capital and no more.

Sales out of Canada, sales out of the province have to be at market price. They have to be at the price the market will pay and clearly that has to be above and hopefully well above our costs. It will not be regulated in the sense that the buyer outside of British Columbia will be protected by regulation; that is the market process. That is unlike the business typically we have done in respect to electricity across this country and especially with the publicly-owned power companies and the regulated power companies, private companies selling to us at home. Domestically, we get our power at cost.

Anything we would export would not be at cost. It has to be at whatever the market will bear. Now we have an interesting wrinkle in British Columbia; the Columbia River Treaty. This involved an arrangement whereby the U. S. side provided funds which were sufficient to pay for these storage dams in Canada. We committed the flow of the Columbian River in Canada to a regime that was beneficial to these dams, and to the numerous dams downstream in the United States. The arrangement really was that in return for building dams and controlling the flow of the upper Columbia, the U. S. side would give us half of the additional generation in the United States.

We sold that half for 30 years in order to finance the dams. This 30-year period will be up in the late 1990's; and we have to decide what we want to do with that particular energy. Now that is the least-cost energy we will ever have, at zero cost to us from the year 2000 on; and as far as we are concerned environmentally it also has to be the cleanest energy we will ever have.

So it is an attractive block of power. It is roughly equivalent with Peace Site C, at about 1000 MW. So it is no mean additional asset resource available to the province. It happens to be owned by the province, not by B. C. Hydro. Now, we can either leave it down there and sell it for whatever the market will bear; or bring it home. My personal view is that we should certainly bring it home unless and until we get some other contracts for long-term export sales in the United States at good prices. Unless the U. S. public and private, utilities are prepared to buy power from one or more other sites in this province at attractive prices, there should be no alternative. We should just bring the downstream benefits home, unless they are prepared to buy other power. Maybe when we know more about the market down there we will know more about what the market will bear.

It is an important issue, it is not one which we have to decide today or tomorrow, but it is important in the planning of B. C. Hydro, and important in the planning of our neighbouring utilities in the United States. The treaty energy sits there like a Site C, as a matter of treaty right; a remarkable asset in terms of low cost and environmental cleanliness. So it's an issue which I want to mention, and it will help us further reduce our power costs in this province or hold them stable while inflation rides up power costs in other parts of the world and especially on this continent. So that is one interesting decision which has to be made.

We will undoubtedly develop more hydro in this province in future, partly because it is low cost, partly because it is environmentally less damaging, at least for the long run, than other ways of generating electricity. We will undoubtedly be working more with industry, such as co-generation projects where wastes are burned at pulp mills, and for example, sawmills; where electricity can be generated partly for the industry's own use, with the surplus being sold to, say, B. C. Hydro. B. C. Hydro is offering those firms the same price that it would have to pay to bring in a new big project, like Site C, it is not saying we will only pay our average historic cost. It is now saying we can avoid the cost or postpone building a Site C for another few days or months if you come on line. So the price that is being offered for co-generation purposes is more attractive to industry than it was a few years ago and we will see a considerable amount of electric energy generated in future from wastes of one kind or another, wood wastes certainly. Perhaps also from solid municipal wastes and so on, and maybe waste wood. We could solve an ash problem in the sawmills around Williams Lake by co-generation development.

We may be able to generate electricity in the Kootenays from waste coal, it is low in sulphur but we will have insist on adoption of the latest and best most thorough way of scrubbing the flue gases which are the effluent form plants of that kind. But we are not under great pressure to act at the moment. We have surplus capacity. We can take our time, and we can certainly bring in co-generation resources in the meantime.

But we will have to decide within the next year or two, or three, whether to go ahead with a Site C, for example, or a Murphy Creek on the lower Columbia and clearly we will have to address all of the environmental concerns. We can afford to pay for them because whatever the costs they can easily be assimilated into this marvelous arrangement we have; where we have a nearly free good being sold at very low prices. Even if the cost goes up five or ten percent, it does not really impact materially on our pocket books or our standard of living. This relatively free good we have out there can carry a lot more in terms of cost related to the protection of the environment, and sustainable growth in this province. We are fortunate; we are certainly blessed in that respect.

Back to co-generation. In reference to the utilization of wastes from industry, I am a firm believer in the dictum that the polluter pays. I do not believe that the public in general should be subsidizing an industry which has a waste problem. The waste problem has to be internalized, has to be dealt with. If one of the ways to deal with a waste problem is to generate electricity and sell it to the grid, fine; certainly that is an opportunity available now that did not exist a few years ago. But I do not see the public in general subsidizing industries with wastes in order to help them dispose of a problem, which they would otherwise under other circumstances have to deal with within their own fence themselves.

Mr. Epp mentioned Research and Development and I am glad to know that the federal government is going to continue to support R & D in the energy area. We are pursuing several initiatives in this province which I believe are important. I will mention only one. That is the Hydrogen cell which Dr. Geoff Ballard is developing over in North Vancouver. It is currently attracting more attention in California than it is around here. Into his fuel cell he feeds hydrogen and air, and, with no moving parts, electricity flows out. The British Navy is very interested, the American Navy is interested, industry in Sarnia is very interested. We are hoping to install one of these cells into an old trolley bus shortly and drive the bus around the city to demonstrate how we could limit pollution from motor vehicles.

This kind of development, right here in British Columbia, shows real promise of creating breakthroughs, especially in the motor vehicle side, where otherwise you have to burn fuels which have certain pollutants in them; he would enable us to burn hydrogen. Now to pursue it back to its fundamentals, the hydrogen would come from natural gas. First, the natural gas would be converted chemically to methanol; the methanol would be carried in the bus in a tank, and on the bus there would be a methanol converter generating hydrogen. The hydrogen and air would drive the bus and there would be no pollutants other than water vapour going up into the atmosphere in the greater Vancouver area. So, there are possibilities like this for the longer term, that is really another use for electricity because it is certainly an electric cell. So, there is another strategic resource in our natural gas.

We have low prices here because our costs are low. We have a problem in that we tend to be wasteful. We can perhaps double our harnessed hydro electric capacity, but beyond that we will have to reach into distant river basins, which introduces problems of various kinds relative to wildlife, and the environment in a broad sense. So maybe there is a limit on the hydroelectric side. We do have fuel resources, we certainly have gas which is relatively clean. We have coal. Coal for the time being is not a necessity as far as power generation for British Columbia is concerned. Alberta relies almost totally on coal, and we might have a coal generating plant in British Columbia exporting to the United States in the 1990's. That is a possibility but again we would have to deal with the environmental aspects of that matter.

We have got people with imagination like Geoff Ballard who are coming along with new devices, new ways of involving electricity, new ways of involving, in this case, natural gas to create a pollution-free type of vehicle engine not only for this part of the world but for the rest of the world in general. So there are lots of possibilities.

The theme of this conference, I know, is Energy and the Environment, particularly Electricity and the Environment, I hope I have stimulated a few thoughts, I am really convinced that electricity is not only the finest form of energy but also that it tends to create a problem because it is nearly a free commodity out in our community and therefore presents quite a challenge from the environmental point of view.

Thank you very much.

## Questions Directed To The Honourable Jack Davis

Don Swoboda:

Indeed, Mr. Minister, you did stimulate a great deal of interest in the audience; we are overwhelmed with questions. But with your permission, we will address a few of those to you, possibly in the next five or ten minutes here.

The two are on similar lines, and there may be others that I have not been able even to get through. "With deregulation of energy and increased responsibility being placed on developers, what role do you see being played by those same developers in self-regulating the environmental implications of their developments?" A similar question, "Will independent power producers have to conform to Hydro's new environmental policy?"

Jack Davis:

Well the province and the federal government has legislation, has guide lines, has regulations, which among other things, say that the assimilative capacity of the local environment must not be exceeded. That certain processes, that certain emissions, are totally taboo.

Private developers will have to observe those same laws, rules, regulations as Hydro does. I would think, in a very general way, there is no difference between Hydro and the private developers in that regard.

Don Swoboda:

"In supporting the siting of a ferro-chromium electric smelter on Vancouver Island; did the provincial government consider the high cost of transmission to the island?"

Jack Davis:

I will say yes and I will say no. The link to Vancouver Island, the latest link, was expensive, is only currently being used to, say, 20 percent of its ultimate capacity. But it exists and because it exists an incremental load is not going to cost us anything to get the power over there. The power that the ferro-chromium plant will use initially is relatively small in amount, but secondly, as I understand it, is energy that Hydro is able to buy from some neighbouring utilities; wheel through its system and deliver at a low price. That situation may not continue indefinitely. We have currently got the capacity, got all sorts of transmission capacity, to deliver the energy; especially to Vancouver Island and there was that window in time when low-cost energy was also available from others.

Don Swoboda:

"Other countries, Japan and Germany specifically, consume only 50 percent of the energy per capita compared to B. C. What initiatives will the B. C. government take to encourage similar per capita reductions in B. C. in particular to reduce consumption by industry?"

Jack Davis:

B. C. Hydro is clearly showing leadership in respect to demand management; and industry, partly with information supplied by Hydro, will increasingly find opportunities to cut costs by using more efficient motors and so on. However, saying that on the one hand, on the other hand I think we must process more of our resources at home if it is economic. The main reason why the Canadians, and British Columbians are no exception, are large consumers per capita is that we have industries like the Trail smelter and the aluminium plant at Kitimat and we have pulp and paper, etc. becoming more power-intensive as well. To the extent we process raw materials in large volume and we process them to partially manufactured products we are going need energy. Electricity is a very useful form of energy so we will continue to be relatively high electricity users per capita; not in our homes necessarily, but certainly because of those resource-processing industries.

Don Swoboda:

"Please explain your statement that electricity is priced near cost when B. C. Hydro pays 20 percent of its revenue to the government and soon another maybe 10 percent through dividends?"

Jack Davis:

Well, Hydro in many respects is the same as a privately regulated utility. It can charge its costs and has to demonstrate its construction costs and operating costs to the regulatory body and, like the private utilities, is allowed to make enough profit on its equity to attract capital to expand if expansion is required. Hydro, until recently, was a 100 percent debt-financed. It is now moving to 80/20, or 75/25, which is the norm in the power industry across this continent and indeed is the formula used in Quebec and Ontario where there is equity as well as debt and because B. C. Hydro is in good shape financially.

Its income side is in good shape and construction costs are relatively low. It is a position to retire debt, this is being replaced by equity which you and I own as citizens of this province. So the province will own 20 percent, let's say, of Hydro as equity and the remaining 80 percent will have been borrowed from people all over the world to cover the debt. So the dividend flows from that equity. Hydro in the past benefited from the fact that you and I guaranteed all of its debt. We guaranteed its borrowings, it therefore was able to borrow money at a lower rate of interest then would otherwise have been the case.

Now there is an opportunity for Hydro not to be so dependent on you and I and our credit, but in fact to pay a dividend as Quebec Hydro does and Ontario Hydro has on occasion. But this does not drive up its rate, it's just that instead of being 100 percent debt-financed, it will be at most 80 percent debt-financed and the remainder is equity which you and I own. That equity pays a dividend as long as Hydro is well managed. If Hydro gets into difficulties the dividend of course will disappear.

Don Swoboda:

I have one more. Actually, I have many more but I will only ask one more. "How can you expect new generating capacity to revert to B. C.'s use after it has been allocated to export sales for decades? Won't the U. S. insist on continued energy exports under terms of the free trade agreement?"

Jack Davis:

Basically the free trade agreement says let the market work. In the case of the power business, it is an unusual market because the players are utilities, they are monopolies. They run on long-term contracts, long-term financing, long-term contracts. A contract is a contract, we will live up to our export contracts. If the contract is for ten years, we will live up to it, we will deliver to the end of ten years and that is the end of it. There are the sceptics who say "Well you will never be able to withdraw that flow of power." Well, first of all, we have the Downstream Benefits to bargain with and secondly the history is otherwise. In the early days of Niagara Falls, the great fear was that Ontario would be exporting electricity and it could never get it back. Well that turned out to be nonsense. Within ten years they were revising the agreement, and it was totally rewritten in the 1950's. It was an indefinite period of export in that case and our utilities across the country have had no problem terminating a contract, writing a new one, or not writing a new one as they chose. If we are selling into this neighbouring area in the United States you have to recognize that a project the size of Site C is a drop in the bucket in the total power pool. It is not a major consideration, but the contracts have to be long enough so that importing utilities have enough time to create their own generation. They tend to favour their own generation anyway, so termination has not been a problem, and it has not been a problem with natural gas. It is not a problem with electricity, in terms of Canadian history. There is no reason in our case, where we are a relatively small supplier, in our terminating a contract when it has run its full course.

## Thanks to the Honourable Jack Davis by Conference Chairman Don Swoboda:

I would like to thank the Minister, on behalf of the gathering here, for for addressing this group this morning. We do not have a gift for the Minister, because of course, as you will recall, the Ministry is the co-sponsor of this function with B. C. Hydro and the Ministry of the Environment. But not having one, I certainly do not want that to lessen in any way the appreciation of the organizers of this Forum, and on your behalf, for the Minister taking time out of his very busy schedule to come and address us this morning. Always a stimulating and enlightening and forward-looking speaker. Always willing to put forth his views on the subject of energy so vital to our future and those impacts as it relates to the environment which he addressed in his responses in this presentation this morning. Please join with me in a warm thank you for the Minister in delivering this address today.

## QUESTIONS FOR DR. JACK DAVIS ANSWERED AFTER THE FORUM

Question:

"What is the provincial government doing to aid the development of alternative non-polluting energy and transportation options such as windmill generation electric public transport and electric vehicles?"

Question by: Silvaine Zimmerman, Greenpeace Foundation

Jack Davis:

We provide seed money for promising ventures. I mentioned Dr. Geoff Ballard and his hydrogen-powered electric fuel cell that could lead to non-polluting vehicles. Offhand, I cannot think of any work on windmill generation that we are funding. California has sites where winds blow consistently and they have developed a sizeable wind-powered generation capacity.

Question:

"In light of EFW (Energy from Waste) and the need for comprehensive recycling, why are you funding new generation projects?"

Question by: L. Herb

Jack Davis:

I assume that when you refer to EFW projects, you are referring to the combustion of municipal garbage to generate electricity. Well, recycling is coming. No question of that. But incineration of garbage is one method of making a virtue of necessity. With land-fill sites filling up all over the country, combustion is one way of getting the bulk of the refuse down substantially. But it doesn't solve the problem. We still have the ash to dispose of, and we can't begin to meet all our new energy needs by burning municipal refuse.

Question:

"How can the provincial government support building coal-fired plants for export in view of environmental concerns?"

Jack Davis:

Well, we're looking at it. If a coal-fired thermal plant can find a market for its power, and it is fulfills all the Provincial and Federal emission regulations, you have to look at it. It's another way of making a virtue of necessity. In the East Kootenays they have vast areas of refuse coal piling up. Alberta generates most of its electricity from coal-fired plants, you know.

Question:

"If electricity is a low-priced commodity, should the price be increased to encourage more efficient and hence reduced use of energy?"

Jack Davis:

Provincial electric utility rates have been declining in real terms (increasing less than the rate of inflation) over the past few years. B. C. Hydro's power costs are expected to increase slowly throughout most of the 1990s. However, since least-cost power supplies are developed first, it is inevitable that power rates will increase to reflect the higher costs of bringing on new projects. In establishing a pricing policy which provides a degree of cost certainty to customers, a balance must be made between providing adequate conservation and supply incentives while maintaining competitiveness with other jurisdictions and recognizing the cost impact of electricity consumers. Over time, electricity prices should move towards the long-run replacement cost of electricity and the true value of the resource relative to other energy resources.

Question:

Justification for export of electricity - does the public support this option?

Jack Davis:

We have been exporting secondary hydroelectric energy during high streamflow years for a long time. I don't think anyone objects to spot exports. Long-term dedicated exports of electricity are really no different from other exports such as oil, gas, timber and so forth. They all have environmental impacts but they carry major economic benefits too.

Question:

"With respect to the export of electricity, what is the provincial government involvement in the licensing process?"

Jack Davis:

Any organization seeking permission to construct a project for export would have to pass a number of hurdles. First, they would be subject to the Province's Energy Project Review Process and would have to submit an application for an energy project certificate. They also have to prove they have a market for the energy. The review process might involve a public hearing before the BCUC. The exporting agency would also need an energy removal certificate. There are a lot of steps along the way and there should be many opportunities for the public to make their views known.

Question:

"With the shift of development to IPPs and deregulation of energy, is the Ministry of Environment equipped to deal with the added responsibility of keeping these various IPP's in step with sound Environmental practice? (Maybe this should be addressed to Mr. Strachan rather than Mr. Davis?)"

Jack Davis:

Well, I will try and answer your question on behalf of Bruce Strachan. The IPPs are not going to be offered any short cuts in obtaining their construction licenses. They will have to comply with all of the Provincial and Federal guidelines. If this requires more work and staff in the Ministry of the Environment, well, it will get them.

Question:

"Will your ministry ensure that B. C.'s resources are most efficiently allocated by requiring B. C. Hydro and West Kootenay Power to come to an agreement making a gas turbine plant in the B. C. interior unnecessary?"

Question by: Donald Scarlett

Jack Davis:

West Kootenay will need additional generating capacity in the foreseeable future. They have a contract to buy base energy from B. C. Hydro, and that can be wheeled over existing circuits to West Kootenay. But to get peak capacity, the transmission interconnection may have to be beefed up. So West Kootenay proposed a gas turbine for peaking support in the Okanagan, which they claim would be less expensive than would contracting for peak capacity from Hydro and upgrading their transmission capability as well. We turned down their application for an Energy Project Certificate following public hearings because there were too many unresolved financial and environmental questions. If they come to us with a new application, we want to make sure that the option of a peaking contract with B. C. Hydro has been thoroughly examined.

Question:

"Why does the United States not want to nationalize power utilities, especially underfinanced Edison Power, but Canadian provinces want control of Hydro?"

Question by: Mark Jaworski

Jack Davis:

Canadians are more tolerant of publicly-owned railways, radio and television networks, airlines and power utilities. In the U.S., Bonneville Power Administration and TVA have operated successfully for over 50 years. I don't think there is any pressure now to sell it to the private sector, although President Reagan considered selling off BPA in the early 1980s.

Question:

"If through "deregulation", private industries can develop the best power production opportunities for the benefit of energy-intensive industry, how will the rest of the B. C. Hydro customers be protected, since they will be left with the less attractive sites?"

Question by: Fred Liebich

Jack Davis:

Energy-intensive industries are often prepared to locate in remote areas where the power can be used at site. So they can develop their own generation for their own use without having to build long transmission interconnections to say, the Lower Mainland. Transmission can amount to nearly half the cost of a remote hydroelectric project. Think of Powell River, Kitimat and Trail, which were all remote communities, when they began.

Question:

"Columbia River Treaty Downstream Benefits - we need a decision by 1990 to plan for 1998 - right? Then we need to decide on them now."

Question by: Anne Edwards

Jack Davis:

The Columbia River Downstream Benefits are scheduled to revert to Canada over the 1998-2003 period. The Province must decide on what to do with the DSBs: use them for domestic power needs; resell them to U.S. buyers; or divide their use between domestic and export markets. Based on preliminary analysis by B. C. Hydro, repatriation would defer the need for new domestic dam construction by 2 years on average -- the estimated value of this delay being $1.1 billion ($1988). Export values could be higher, given the higher cost of new plant additions in the United States. More market intelligence is required to make a proper valuation of the benefits. POWEREX will gather that intelligence through an ongoing market study, and negotiations with BPA and others. The Province will aim for a final decision on the DSBs during 1990/1991. (Under the Columbia River Treaty, an Assured Operating Plan must be agreed upon annually, and extends 6 years into the future. The AOP report prepared in 1992 will be the first that extends into the period that downstream benefit returns could begin.)

Question:

"How do you view the "clean" energy to be returned via the Columbia River Treaty in the context of Global Environmental issues if to return it, the U.S. must build either a coal-fired or nuclear plant with their attendant environmental concerns?"

Jack Davis:

Well that is a problem which our neighbours in the U.S.A. will have to address. There are other alternatives, such as funds to acquire more expensive conservation energy savings; gas-fired thermal or additional hydroelectric. It isn't just coal or nuclear.

Question:

"Instead of building more generating facilities for power export, wouldn't it be both more economically efficient and environmentally acceptable if (still) more funds were invested in conservation and the power saved was exported instead?"

Question by: Timo Makinen, SFU

Jack Davis:

Well, that would be the best of all possible worlds. Many people in the United States think that by funding aggressive conservation programs here in British Columbia we will be able to postpone the need for either the return of the Downstream Benefits or the need to embark on new hydroelectric construction here in Canada. But our projections indicate that "Power Smart" can only take us part of the way. The IPPs will be required to meet domestic as well as export loads.

Question:

"What is your position on building for export with regards to the well-being of the B. C. environment?"

Jack Davis:

Everyone seems to be concerned with this issue. I repeat that any export project will require environmental approval before it gets the green light, and will have to comply with all of the provincial and federal emission guidelines.

Question:

"You are in favour for export of surplus electricity. Is Site C being built to create that surplus or is Site C being built for B. C.'s own energy needs?"

Jack Davis:

It would be built for B. C.'s own energy needs. But once built, during years of above-average river flows we will have extra hydroelectric energy at Site C that is not "firm". I would expect that we would continue to export such "secondary" hydroelectric energy.

Question:

"The NEB reviews and approves transmission lines for export of power to the U.S. What is the provincial involvement with respect to the BCUC Act on those transmission lines of less than 500 kV?"

Jack Davis:

Transmission lines of less than 500 kV are not regulated under Part 2 of the Utilities Commission Act, but they are subject to the BCUC's scrutiny under Part 3, the section which regulates additions to a public utility's system. Smaller lines are also referred by B. C. Hydro to several provincial and federal agencies for their review and comment.

Question:

"Under Free Trade can B. C. sell electricity in the U.S. at high market based prices at the same time that it is sold in B. C. at low cost based prices?"

Jack Davis:

Under the Free Trade Agreement electricity prices will reflect what the market will bear. If the cost of alternative electricity supplies is higher in the U.S. market than it is in the British Columbia market (as is the case), then B. C. can sell electricity to the U.S. market for higher prices than those paid in the domestic market.

Question:

"Will the incentives offered by Hydro during the 80's to absorb temporary power surpluses be eliminated now that Hydro is needing new power sources?"

Question by: W. Purssell

Jack Davis:

There were two programs introduced during the mid 1980s to market surplus electricity at reduced rates for the purpose of assisting provincial industry. One was under the Critical Industries Act which assisted marginal forestry and mining operations to continue operations. This Act was repealed in June 1987. The second was the Industrial Electricity Discount Rate Act which was established to attract new industrial investment to the Province. As a result of the higher than expected load growth, B. C. Hydro's firm hydroelectric surplus is expected to be exhausted this year. Hence, the end of this power discount program was announced in August 1988.

Question:

"Even though electricity is inexpensive, will your department support energy efficiency for the sake of consumers and the environment?"

Question by: Laverne Dalgleish, National Energy Cons. Assoc.

Jack Davis:

B. C. Hydro has announced its Power Smart program intended to save energy that would otherwise have to be provided from new power projects. Electricity saved by conservation is much less expensive for the customer than buying power from new generation. In addition, it is environmentally clean. Clearly, we should develop all the conservation we can until it costs us more than new generation, at which time we will have to reconsider new generation plants.

Question:

"How do you consider that Columbia River generation costs us nothing or nearly nothing if we are selling energy to U.S. after the year 2000, when keeping it ourselves would allow us to replace the high costs of new projects environmentally, and financially?"

Jack Davis:

Based on preliminary analysis by B. C. Hydro, repatriation of the Columbia River downstream benefits would defer by 2 years on average (not replace) the need for new domestic dam construction -- the estimated value of this delay being $1.1 billion ($1988).

Question:

"Will the government look at lowering the water tax to the IPP's as they did with industry generating their own power, thereby allowing more projects to be viable?"

Question by: A. Knott, Central Coast Power Corp

We are considering a 50 percent reduction of the energy component of water rentals for new private power developers using the power for their own productive purpose or selling it to a power-intensive resource processing industry in the Province. Private power producers selling to B. C. Hydro or POWEREX will pay the higher existing rate.

Question:

"Why are you implementing a 3 percent rate increase this year. There is no apparent cost pressure with the Columbia River energy available in late '90's at very low cost - why the current increase?"

Jack Davis:

With the cost of living rising at about 4 percent per year recently, a 3 percent rate increase really amounts to a 1 percent reduction in the cost of electricity; instead of 4 percent reduction, in effect, if no rate increase is introduced. We don't want the price of electricity to get so low that people won't be encouraged to conserve and there is an inefficient use of this energy resource. Any final decision on rate increases is subject to Utilities Commission review.

Question:

"Would you consider offering higher price for electricity from wood wastes which helps clean environment?"

Jack Davis:

We are looking at it with the Ministry of Environment. For example, if a wood waste-fired plant is to use the best available technology to control emissions and this increases the capital cost of the plant, we may ask Hydro to offer a little more for the electricity.

Question:

"Why is the provincial government considering export sales which would subsidize American manufacturing at the expense of Canadian jobs and wealth creation?"

Jack Davis:

Energy generated for export would be at a price set to whatever the market will pay. Such projects would export at a profit, so it cannot be said they would be subsidizing American manufacturing. Under Free Trade, the same U.S. factories could locate in British Columbia and take advantage of our existing lower rates, based on average costs.

Question:

"Ontario Hydro, and other hydroelectric generation in Ontario also pay a "water rental". However, private hydroelectric power producers are provided with a 10-year "holiday" to encourage development. What is B. C.'s policy on water rentals paid by private power producers? Do these charges discourage development?"

Jack Davis:

I have already mentioned the proposed 50 percent reduction of the energy component of water rentals for new private power developers using the power for their own productive purpose or selling it to a power-intensive resource processing industry in the Province. Private power producers selling to B. C. Hydro or POWEREX will pay the higher existing rate.

Question:

"Will the provincial government enact legislation to protect our waters from hydrocarbon pollution such as enacting a legislated permanent oil and gas exploration moratorium?"

Jack Davis:

Well now, you probably own an automobile which uses gasoline and oil. That oil has to come from somewhere. Maybe what we need are tighter regulations so that single-hulled tankers are not permitted near our coastal waters. But that sort of legislation would be a federal matter, not a provincial matter. The North Sea oil fields have worked pretty well, I think. The existing exploration moratorium will remain for at least another 5 years, and we see no need to enact legislation to achieve what we have already achieved.

Question:

"Considering hydrocarbon exploration can be so environmentally damaging, is the provincial government going to initiate legislation that would make "the moratorium legally binding," as did Nova Scotia?"

Question by: Silvaine Zimmerman, Greenpeace Foundation

See above response.

Question:

"Several of the IPP proposals use sites "earmarked" by B. C. Hydro - such as Murphy Creek. If we use Murphy Creek for export might we not end up with a higher cost (both economically and environmentally) project to satisfy domestic needs?"

Question by: Deb Sherwood, Environment Canada

Jack Davis:

The whole issue of developing Columbia hydro projects for export is under review. Many would rather see IPPs develop Murphy Creek and Keenleyside in response to B. C. Hydro's domestic proposal calls.

# Recognizing the Value of Water Resources

Dr. Peter Pearse

Professor of Economics and Forestry at U.B.C.

and

Chairman of the Public Inquiry

on Federal Water Policy (1984-1985)

Introduction by Mr. Don Swoboda, Conference Chairman:

Introducing the next speaker I would like to share with you a little bit of trivia. Ten years ago this month and in this hotel, Hydro, along with seventeen other corporate co-sponsors hosted a function that drew some 500 people. It was a day and half long session, which consisted of debate on the proposition that Canada needs a national development strategy. At this meeting there were panel discussions with perspectives on growth and special concerns regarding growth and development.

One of the panelists at that Forum was Peter Pearse. Now Peter Pearse is currently a Professor at the University of British Columbia in Economics and Forestry. Dr. Pearse has been a commissioner of several Royal Commissions on the Forestry Resources of British Columbia, Pacific Fisheries Policy and he served as chairman of the inquiry into Canada's Fresh Water Fisheries Policy, and most recently, chairman on the inquiry into Federal Water Policy.

Dr. Pearse has published numerous research articles and books on government policy relating to the management of renewable resources particularly forests, fisheries, and water resources. He has received several awards for his work and his leadership including the Canadian Forestry Achievement Award and he is a Member of The Order of Canada. Please join with me in welcoming to this Forum Dr. Peter Pearse, of the University of British Columbia, who will address us on recognizing the value of our water resources.

# MANAGING WATER FOR WHAT IT'S WORTH

BY

PETER H. PEARSE

PREPARED FOR

THE SECOND ANNUAL ELECTRIC ENERGY FORUM

VANCOUVER, MAY 10-12, 1989

# MANAGING WATER FOR WHAT IT'S WORTH

BY

PETER H. PEARSE

## ABSTRACT

The current popularity of "sustainable development" calls for careful examination of the interdependencies of economic activity and environmental resources. Water provides a sharp focus for these issues, because it is such a pervasive and crucial element in both economic production and the natural environment. Traditionally regarded as virtually limitless in Canada, water and its waste assimilative capacity is now over used in some regions. Demand needs to be managed. Promising opportunities for reconciling economic activity with the capacities of the natural environment lie in extending market rationing processes and ensuring that users recognize the value of the resources they use by paying a price for them.

# MANAGING WATER FOR WHAT IT'S WORTH

by

Peter H. Pearse[1]

## Introduction

Since the World Commission on Environment and Development reported in 1987, we have heard a great deal about "sustainable development".[2] The idea of sustainable development seems to appeal to almost everyone, because it implies support for both the advocates of environmental protection and the proponents of economic growth. Indeed, the Brundtland Commission, which popularized the concept, is explicit about this: economic growth and environmental protection are not only both desirable and possible, they go hand in hand, one complementing the other.

This is a striking contrast to the dark predictions of the Club of Rome a few years earlier. "The Limits to Growth" concluded in the early 1970s that if economic activity continued to expand the world would deplete its supplies of essential natural resources and food and suffocate in environmental degradation by the mid 1980s.[3] In fact, the opposite happened. World production expanded at an unprecedented rate and almost all natural resources products became less scarce, whether scarcity is measured by the quantity available or by price. So it was reassuring for the Brundtland Commission to inform us, retrospectively, that the Maltheusian predictions of the Club of Rome were wrong and what we achieved was actually possible.

The Brundtland Commission has served a valuable purpose in drawing public attention to the interdependence of the environment and the economy, but I am left uneasy about two aspects of its call for sustainable development. One is that the opportunity for continuing economic growth coupled with continuing environmental improvement is simply asserted. The theoretical underpinning of this argument is vague, and although it cuts into the core of a two-hundred year old debate among the world's greatest thinkers it does not offer new insights or evidence for its comfortable conclusion. As a result, it is unconvincing.

More worrisome is the ambiguity about what sustainable development means in a policy sense. The Brundtland Commission tells us it means continuing economic growth without impairing the capacity of future generations to grow. But this tells us more about what are to achieve than how to achieve it.

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Note: Footnotes refer to references at the end of Dr. Peter Pearse's paper.

I would like to address these questions with specific reference to our water resources. Water is an integral part of the natural environment and it is also an essential input for economic production.

Indeed, no other resource is such a pervasive element in both the natural environment and economic activity. As a result, water management provides a sharp focus for the general policy of reconciling our economic objectives with our environmental goals.

## Abundance: Perceptions and Realities

Water is so abundant in Canada that we tend to take it for granted. The danger is that perceptions of plenty lead us to disregard of the value of this natural resource and its need for careful management.

Canada contains about one-quarter of the world's stock of fresh water, some nine percent of the total annual flow, and more surface area of water than any other country. Moreover, though we know little about them, underground aquifers probably contain several times the amount of water on the surface.

The water we use, in the sense of withdrawing it from its natural setting, amounts to a little more than one percent of the average continuing flow, and the quantity we consume, in the sense that it is not returned to its natural watercourse, is about one-tenth of that. Water is so abundant in Canada, relative to our demands on it, that it hardly appears to warrant much concern.

These indications of abundance are deceptive, however. One reasons is that aggregate statistics for the whole country disguise regional exceptions. Most of Canada's great rivers flow to the Arctic Sea, Hudson Bay and north Pacific, away from the southern concentrations of our population and industry, leaving some areas of heavy demands with scarce supplies. Another reason is that all regions are susceptible in varying degrees to flood and drought, adding a temporal dimension to scarcity. And finally, many of our most serious management problems are not related to the adequacy of flows but rather to the quality of water supplies, the disruption of natural flow regimes and conflicts among uses and users. The degradation of water quality, especially, is concentrated in waterways near centres of population and industry, precisely where its effects are most severe. In short, water presents all the economic problems of allocating scarce resources among competing uses.

It is worth noting, also, that the economic dimensions of water management in Canada are very substantial. Existing municipal water supply and treatment infrastructure in Canada has an estimated replacement cost of well in excess of $100 billion, and it requires continuing rehabilitation, up-grading and expansion. Much more capital is directed to hydroelectric storage, agricultural irrigation and industrial water systems. The contribution of water to the Canadian economy defies reliable quantification, but its value (in terms of the users' potential willingness to pay for it) in its major economic uses has recently been estimated at between $7 and $23 billion annually.[4]

The benefit Canadians derive from water is not limited to its economic uses, of course. Water has a subtle but significant influence on Canadian values and national identity. Canadians, as well as foreigners, think of Canada as a land laced with great rivers, rippling streams, placid lakes and snow-capped mountains. While we rarely articulate the importance of these features to our perceptions of our country, it is reflected in Canadian art, ballads from Newfoundland to Yukon, tourist brochures, and even our national anthem's reference a land "where lordly rivers flow". Moreover, water has shaped the lifestyle of many Canadians, most intimately that of native peoples but also, probably more than in other countries, the high proportion whose choice of work, recreation and places to live is influenced by water and the amenities it offers.

In short, water is a major influence on Canada's economy, social attitudes and natural environment. Paradoxically, because of its pervasiveness, water has not been a major concern of public policy. It has tended to be incidental in public debates about hydroelectric policy, agriculture projects and fisheries.

## Development of Water Policy

Our public policies for managing water in Canada have been dominated by concerns for accommodating uses of water. Early attention focused on navigation, because of the strategic importance of St. Lawrence waterways and the need to transport timber and other goods. This stimulated major public and private development of canals and other works by the middle of the 19th century. Over subsequent decades, federal and provincial governments turned their efforts to managing water for purposes of fisheries, agriculture, industry, municipal supplies and hydroelectric generation. Water policy thus developed; but it was not a policy for managing water per se so much as a collection of disparate programs for developing water in support of particular economic activities, administered under a variety of legislation by specialized agencies. Correspondingly, the early cooperative arrangements with the United States dealt with water works for navigation, hydroelectricity and irrigation.

After World War II, water resources continued to be viewed as means of nation-building, and projects, often of huge scale, were undertaken to develop hydroelectric power, agriculture and seaway transportation. But, in response to growing pressures and conflicts in some waterways, attention began to be directed to the need for coordination in resource development. Federal and provincial governments thus established arrangements for cooperative development of major projects and integration of water developments within regional plans. The concepts of coordinated development and multiple use began to bear on water resource development, but they were viewed mainly as constraints on single-purpose economic uses of water.

In the mid 1960s a new and broadly-based concern for the environment had a profound impact on approaches to water management. Nearly all governments created a Department of the Environment and assigned it responsibility for controlling water pollution, among other things. Water began to be considered not just a means of promoting development of other activities but as an essential component of the environment demanding management in its own right.

This new recognition of water as a resource demanding specific policy attention was reflected in major policy developments in the 1970s. New federal legislation and provincial regulatory arrangements dealt specifically with water. Pollution control was given much attention in new statutes, and in cooperative arrangements with the United States, especially on the Great Lakes.

In addition, increased effort was directed toward federal-provincial cooperation in water programs ranging from data collection to sewage treatment. Finally, the need for integrated management of watersheds was recognized in intergovernmental arrangements for river basin studies and plans and in arrangements for managing watersheds on a coherent basis.

These new efforts imply a recognition that in order to sustain the environmental and economic benefits derived from water, these resources must be developed and used with more attention to the natural character of hydrologic regimes, their interdependence with other elements of the environment and the interdependence of uses of them.

## Recent Developments

Notwithstanding these developments, the early 1980s witnessed growing public anxiety about a wide range of water-related questions; pollution, destruction of fish habitat, interbasin transfers and water exports, the cost of municipal water supplies and waste treatment systems and the quality of draining water to name a few. Federal and provincial water policies were perceived as uncoordinated, piecemeal and inadequate to cope with the growing demands on water resources. As a result, my two colleagues and I were appointed in 1984 to conduct the Inquiry on Federal Water Policy, with wide terms of reference to investigate water issues within federal responsibility and to make recommendations for policy improvement.

The Inquiry embarked on an intensive program of public hearings across Canada, as well as good deal of research and consultation. Our 1985 report, "Currents of Change",[4] contains wide-ranging recommendations for changes in policies, legislation, arrangements with provinces and the United States, planning and regulatory arrangements, administrative organization, public participation and research.

Two years later, in November 1987, the Government of Canada published its first comprehensive statement of federal water policy, which incorporated many of the Inquiry's recommendations.

## Toward Demand Management

Rather than attempt a superficial sketch of all these changes, I would like to comment on the new emphasis on so-called "demand management," advocated by our Inquiry and embodied in the new federal policy.

Water management in Canada has traditionally focused on managing supplies. Natural water systems have been harnessed, stored, regulated and diverted in various ways to accommodate needs as they arose. Typically, the most convenient sources were developed first; then as needs expanded, the less accessible, more costly resources were developed. As long as water was plentiful relative to demands, supply management was a logical and satisfactory approach.

Today, however, the policy of simply increasing supplies to meet growing demands is getting us into difficulties. First, the cost of providing additional supplies for municipal, industrial and agricultural uses typically rises sharply when the infrastructure must be expanded and delivery systems extended to tap more remote sources.

Second, expanding water supplies for all uses, without regard to the value of the water in different uses, inevitably leads to conflicts that are difficult to reconcile. And third, increasing supplies, with the diversions, storage and other works that this typically involves, inevitably disrupts natural water systems and raises all the well-known environmental concerns.

The traditional supply management approach -- putting in a bigger pipe as demands grows -- still serves the purpose in remote Canada where natural supplies are abundant and the needs are light. But throughout the developed parts of the country, near concentrations of population, industry and agriculture, it has begun to fail us badly. The evidence is in increasing costs, recurrent conflicts and environmental degradation.

For all these reasons there is growing support for a shift in emphasis toward managing demand as well as supply. Demand management involves using water more efficiently, more conservatively and less wastefully.

These words, it can be argued, tells us more about what we want to achieve than how to achieve it, a fault I found with the Brundtland Commission's sustainable development. So I will devote the remainder of my remarks to what demand management can mean in operational terms.

There are enormous opportunities for improving our efficiency in water use. Canadians use more water per capita than any other people in the world except the Americans, and double the amount of most Europeans.

The techniques available to us include recycling systems in industrial plants, improved irrigation methods, water-efficient plumbing in domestic housing and pricing, all well-tested elsewhere. Counterparts can be found in the energy conservation programs in response to the oil crisis of the 1970s, which profoundly altered the demand for energy and dampened its growth.

## Pricing

Of all the techniques of demand management the most effective is pricing. A price charged for water consumed, like the price charged for electricity or natural gas, provides incentives to avoid waste and use water efficiently. And the higher the price the sharper the incentives.

At present, pricing arrangements for water in Canada are rudimentary. Many municipalities levy fees for water and sewage services, but often only at fixed rates and rarely with reference to all costs. Most provinces charge fees for water used for electrical power generation, and modest rates are sometimes levied for water used for industrial purposes. Agriculture, which accounts for over 60 percent of the water consumed in Canada, typically pays a small fraction of the cost of delivering the water, let alone the cost inflicted on downstream users, fisheries and environmental values.

British Columbia has adopted the most advanced pricing policy, but it is still in the process of being implemented. Ontario is currently studying the possibility of adopting a "user pay" policy.

As long as water is provided without a price attached to it, users cannot be expected to recognize the value of the resource, the cost of supplying it, or the cost of disposing of it safely after it is used. Water is regarded as a free good, and users, lacking any financial incentive to economize, tend to use it wastefully. In cities where water is supplied to households free or at fixed rates regardless of use, the average household use is often double that in cities where water is metered and priced.[5] Excessive use creates a need not only for more water, but also for additional capacity in municipal water systems and waste collection and treatment works. People who get their water "free" ironically end up paying more for it one way or another, and the burden is not distributed among them according to the resources they use. Nor is the environmental cost.

In contrast, a suitable price serves several useful purposes:

- It creates incentives to avoid waste and to use water efficiently, thus contributing to water conservation.
- By reducing the water needed and the waste disposal capacity, it reduces infrastructure costs.

- The resulting lower demand reduces environmental pressures on water resources.

- By demonstrating users' willingness to pay for water, prices help to allocate supplies among the uses and uses so that the highest value is generated from limited resources.

- Pricing generates revenue that can cover the cost of water supply and waste disposal systems.

- Suitable pricing can ensure that the cost of water services is equitably borne by the beneficiaries according to the benefits they receive, according to the "user pay" and "polluter pay".

These considerations underlie the increasing support for pricing water, from consumer groups as well as business representatives. The main obstacle appears to be inertia.

A perfect pricing system for water would include elements of fixed costs, variable costs and an allowance for the value of the water itself at least equal to its value in alternative uses. And effluent charges would similarly account for direct costs as well as demands on the assimilative capacity of waterways. In practice, simpler formulae are usually adopted. Transferable water rights provide similar market incentives and a simpler policy alternative in many circumstances.

## Toward Sustainable Development

This approach to managing our demands on water resources illustrates more general opportunities for reconciling our economy with our environment. The parts of our natural environment that suffer most from our economic activity are those that we have excluded from the market system. This is no coincidence. By not charging a price, we invite producers to use resources like water, and the waste assimilative capacity of water and air, as if they are free and, not surprisingly they do. We try to prevent excesses by invoking governmental controls and regulations, but they are inevitably arbitrary, inflexible and therefore costly.

One does not have to be an advocate of free enterprise and the market system to recognize the bias we have built into our economic system against the attributes of nature that we need in our economic activity but exclude from the pricing and rationing process.

Over the last two centuries as the Canadian economy developed, one natural resource after another has become valuable: fur-bearing animals, agricultural land, minerals, timber, water and fish. As each came under increasing demand, we developed ways of allocating it among users, assigning rights to use it, and bringing it within the ambit of the market mechanisms for balancing demand with the supply. But this evolutionary process has not kept pace with the new pressures on resources that have become scarce only recently.

It is no coincidence that the environmental resources that are suffering from our economic activity are those that we deny the protection of market rationing: our wildlife, our sport fish, our water and air and even the ozone. Our efforts to protect these resources from degradation by the alternative means of restrictive regulations has been discouraging.

This general point is illustrated by the recent recognition of this "market failure" in commercial fisheries, and encouraging efforts to deal with it. Some of the world's leading fishing nations have recognized the "tragedy of the commons"; free-for-all fishing leads to resource depletion and economic waste, and attempts to control it by restrictive regulation leads to costly inefficiencies. But if, instead, we specify the catch that the stocks can sustain, and assign well-defined rights to it, fishermen will sort out the most efficient way to harvest it and begin to take an interest in managing the resources as well. The same can be done to overcome abuses of water, air and other environmental resources that currently lack the protection of the market system.

## Concluding Comment

Canadians generally want to take advantage of the potential economic benefits of water resources while at the same time preserving the health of the natural environment. Notwithstanding the inevitability of compromises in these goals, they are undoubtedly jointly feasible. Even reductions in our use of water, where and when that might be necessary to protect the environment, would not preclude further economic growth. The task is to design management systems that will produce the right balance of uses and environmental values in widely varying circumstances.

Our quest for sustainable development forces us to search for better ways to harmonize economic activity with the natural environment. There is no simple solution: we will probably need a complicated mixture of market processes, prohibitions and regulatory arrangements. But we should begin by taking a hard look at the artificial line we have drawn between economic and environmental resources. Some resources that we have traditionally regarded as surplus to our needs have become scarce and valuable, and we are over-using them. If we are going to reconcile our demands with the capacities of the natural environment we will need some demand management. And our historical experience tells us that our efforts will be most effective if we harness the financial incentives of users by ensuring that they recognize the full value of the resources they use.

# FOOTNOTES

1. Professor of Forestry, the University of British Columbia.

2. World Commission on Environment and Development (Brundtland Commission). 1987. "Our Common Future". United Nations. New York.

3. Meadows, D.H., D.L. Meadows, J. Randers and W. Behrens. 1972. "The Limits to Growth". Universe Books. New York.

4. Pearse, P.H., F. Bertrand and J.W. MacLaren. 1985. "Currents of Change". Final Report of the Inquiry on Federal Water Policy. Environment Canada. Ottawa. 186 pp. + Appxs.

5. Hanke, Steve and M. Fortin. 1985. "The Economics of Municipal Water Supply: Applying the User Pay Principle". Research Paper No. 21, Inquiry on Federal Water Policy. Ottawa.

## Questions Directed To Dr. Peter Pearse

Don Swoboda:

Dr. Pearse, a few questions. "In you opinion, is the export of electric power to the U. S. worth the environmental and economic impact upon the Canadian public?"

Peter Pearse:

Well, if I may pick up on a line from Jack Davis, to the extent that the costs are sunk, yes. The continuing exportation of hydroelectric energy to the United States does not always involve us in more environmental damage because the dams are already in place. With respect to possible new developments, it is very difficult to answer that question in the abstract, because the environmental implications of projects vary with each case. Being an economist, I am tempted to respond with a trite answer that as long as the benefits exceed the costs and the costs include the environmental costs, then it is advantageous by definition. But it must be looked at in each individual case.

Don Swoboda:

A question a little closer to home. "Please comment on the health quality of the Vancouver water supply?"

Peter Pearse:

I am really the wrong person to be answering that particular question. Except that I can say, as many people know, that Vancouver has one of the purest water supplies of any city of its size in Canada and indeed in the world. We are very jealous of that, and protective of it, which of course has led us to some controversy these days about gas pipelines that might be routed through our Greater Vancouver watershed. I can add that having conducted some hearings across this country, I know that Canadians are very sensitive about water. We do not do very much about it, but we are very protective of our water. We get into some very confusing arguments about things like exporting water and the purity of water.

It is obvious that in Vancouver, where we have a single-use watershed, more or less, we are very anxious to keep out other users. You know, there are many cities in North America, and I am not suggesting that we should emulate them, that hardly have drinking water until someone up the river flushes the toilet. We are very lucky not to be in that position and I am sure that the residents of Greater Vancouver are not going to allow anything to impair the quality of their water.

Don Swoboda:

A very descriptive answer, thank you. Next: "Could you comment on the policy Canada should adopt relative to major water export schemes such as the North American Water and Power Alliance?"

Peter Pearse:

Yes, the NAWAPA scheme that you refer to is, as far as I know, very much on the back burner and I do not think that there is anyone pressing for that scheme nowadays. The question of water export mega-projects, these days, is dominated by the so-called GRAND Canal Scheme which would involve dyking off James Bay to turn it into a fresh water lake and then an extremely expensive system of canals, pumps, and locks, and other water systems to lift that water over the Canadian Shield, and into the Great Lakes, and then by another very expensive and costly distribution system across the United States to the U. S. southwest. There most of the water would be dumped onto dry agricultural lands for the purposes of farming.

That scheme does not make any economic or environmental sense, as far as I can see. The cost of taking the water from James Bay and delivering it to the U. S. high plains states in the southwest far exceeds, by many orders of magnitude, the value of that water delivered there. We are speaking about delivery costs of one or two thousand dollars per thousand cubic meters. The value of the water to farmers in the U. S. southwest, who account for most of the demand, is between one and two hundred dollars per thousand cubic meters. The farmers are actually paying something like a tenth of that in many cases. So, it is just completely out of the realm of economic feasibility. Mind you, having said that, that has rarely stopped either Canadian or U. S. governments from indulging in water projects of that nature in the past. So, we cannot say that on those grounds it is a dead issue.

On environmental or strategic grounds or in Canada's national political interest, there is not a great deal to be said for these projects either.

Our inquiry looked into the whole issue of water exports, which is a very sensitive issue, but it is important to recognize that there are some kinds of water exports that do not carry those implications. For example, you have probably all heard of small-scale water export schemes through tankers or municipal water systems. We have had, in the past, exchanges of water between Surrey, just down the road, and the state of Washington. That is certainly water export but it seems to be harmless, in terms of ecological effects or terms of any sort of national strategy. It is just good neighbourly relations. The town of Coutts, Alberta, has a water pipe across the U. S.-Canada border to Sweetgrass, Montana, and that is a neighbourly accommodation. There are two or three other circumstances like that along the U. S. border. That kind of water export does not seem to raise any large issues of national concern that we should be worried about, so I am not against water exports in principal. I just think we have to look very carefully at mega-projects that involve inter-basin transfers and commitments of water that would reverse the existing patterns of water systems across the continent.

There are other kinds of water export schemes, including a firm now in Vancouver that is quarrying ice from glaciers for export to the cocktail bars of Tokyo. I do not see any reason why we should regard that as an issue that we should prohibit.

Don Swoboda:

We have time for one more. "You speak much of the value of water for industrial and economic uses. What about other social uses of water? What is their value? Can we speak of supply and demand management of these other social uses?"

Peter Pearse:

Well, these other uses are extremely difficult to quantify, of course, but they are no doubt very substantial. It is not only the general environmental value of water in terms of the enhancement of the landscape and the pleasure we experience from viewing it. The fact is that the lifestyle of many Canadians is intimately effected by water. Most intimately, I suppose, by the native people of this country. But not just them. Many people in Canada choose the place they live because of the amenities that they can gain from being near water. Most of Canadian cities are on major waterways, which are used extensively for recreational, as well as esthetic values. It is interesting to note too that water affects Canadians' lifestyles, art forms and sense of identity. It is no coincidence that most Canadian art depicts water in one form or another. We think of this country as a land laced with mighty rivers and rippling streams and snow-capped mountains and so on. It appears on all of our tourist brochures. Not only foreigners, but also Canadians, think of this country as a land of waterways. There is even a reference in our national anthem to Canada as a land "where lordly rivers flow." These values are extremely difficult to quantify in ordinary economic terms and I would be the last one to try to do that. But that does not mean to say we should not recognize this value; it just means that it is hard to measure. In fact, we should always make a special effort to take full account of these values that we have difficulty quantifying.

## Thanks to Dr. Peter Pearse by Mr. Brian Gates, Ministry of the Environment:

Don Swoboda:

Thank you very much. I would now like to call on Brian Gates of the Ministry of the Environment, and another co-sponsor of this Forum, to thank our speaker. Brian.

Brian Gates:

We are honored to have Dr. Pearse address us today and I am honored to be asked, on behalf of my Ministry of the Environment, and of the Ministry of Energy, Mines, and Petroleum Resources; and of course B. C. Hydro, to thank Peter for his contribution. Peter and I go away back to the days when he pioneered the art of placing economic values on common property resources, particularly fish and wildlife. As a wildlife biologist, his work meant a great deal to me and to my collegues, and of course to all of those who enjoy fish and wildlife. We finally got a handle on putting some values on these things, and of course his pioneer work has been extended far beyond that now. Then Dr. Pearse took on the problems of Canada's water issues, later forest issues, commercial fishing issues, among many other things he has done. All of these are critically linked to the protection of the environment and to the concept of that we call sustainable development within a sustainable quality environment. Consider that each of you is made of more than 90 percent water and then reflect on Peter's remarks. On behalf of the sponsors, Peter, and on behalf of those attending today it is my pleasure to thank you, and I hope that we can all take wisdom from the advice that you have given us today. Thank you, Peter.

## QUESTIONS FOR DR. PETER PEARSE ANSWERED AFTER THE FORUM

Question:

"Could you expand on your idea of assigning rights e.g. in the context of managing a watershed such as the Peace - should B. C. Hydro assume the responsibility for operating this watershed for power and sustainable natural resources?"

Peter Pearse:

The point is that if we want all resource values to be recognized, and properly weighed against each other when they conflict, we should consider removing some of the bias that arises from some values being firmly vested in property rights while others are not. For example, if a timber company has the right to the timber in a valley, but nobody has a corresponding right to the fish in the streams that would be disturbed by logging, there is no legal or economic basis for striking the right balance between fish production and timber production. We have to resort to governmental regulation to protect the values that are not embodied in rights. The same is true for wildlife, water, the waste-absorbing capacity of water and other resource values that, in this country, we typically isolate from market processes and which, as a result, get neglected and abused.

We also end up with continuing conflicts when there is no market process to resolve them. There are hundreds of examples, like the Columbia River in the United States, of unending battles between fishing interests and power generation interests. The value of the fish is blurred because the rights to them are not held by anyone who can claim them and assert them in a way corresponding to the value of power, so the only recourse is appeal to government regulators, which is often not very satisfactory. Goodwill, cooperation, and good regulation all help, of course, but in my opinion it would be more helpful to eliminate the built-in biases that stem from the poorly- defined rights to some resource values.

Question:

"What electric pricing policies would you recommend to reduce per capita consumption?"

Peter Pearse:

In principle, the optimum price is the marginal cost; that is, a price equal to the incremental cost of expanding production. Most utilities in Canada charge prices closer to average costs, which are typically well below marginal costs. So a shift to marginal cost pricing would involve increasing prices, which would undoubtedly reduce per capita consumption. The economic justification for marginal cost pricing is very solid, but of course any major price increase would encounter resistance and difficulties of adjustment.

Question:

"I would challenge your interpretation of Brundtland. Brundtland speaks of economic growth in developing countries, and recognizes that economic growth is but a part of development. How would you respond?"

Peter Pearse:

The Brundtland Report discusses economic growth in the global context, and its implications for the global environment. It suggests that the major cause of environmental deterioration is poverty, and the pressures of poverty, population growth, resource depletion are concentrated in the Third World. Economic growth is the way to reduce poverty, so sustainable economic development and environmental improvement go hand in hand. But the challenge posed by Brundtland is how to change our ways so that we can enjoy continuing economic growth without inflicting more damage on the global environment.

# Our Target for the Future: A Sustainable Energy Supply

**Jim Jura**

**Administrator**

**Bonneville Power Administration**

Introduction by Conference Chairman Mr. Don Swoboda:

Our next speaker is a neighbour of ours to the south. Jim Jura is the Administrator of the Bonneville Power Administration, or B.P.A. as we know it. Mr. Jura received a Bachelor's Degree from the University of Washington and a Master's Degree from Seattle University. He has worked for the Boeing Company, the Department of Labour, in the office of Management and Budget, before joining B.P.A. in 1978. He was appointed as B.P.A.'s Administrator, the senior position in that organization in 1986. As head of Bonneville, Mr. Jura will play an important role in the negotiations of the Columbia River downstream benefits and in the purchase and transmission of electricity from Canada. We are delighted that he has come to join this important Forum and provide his contribution to the studies and examinations that we are providing today and tomorrow. So I ask you welcome with me Jim Jura, the Administrater of the Bonneville Power Authority who will speak on U. S. Northwest energy and environmental issues. The title of his talk is, "Our Target for the Future: A Sustainable Energy Supply." Mr. Jim Jura.

British Columbia Hydro & Power Authority

2nd Annual Energy Forum

Vancouver, British Columbia

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James Jura, Administrator

U.S. Bonneville Power Administration

# OUR TARGET FOR THE FUTURE: A SUSTAINABLE ENERGY SUPPLY

## (Energy Development and Environmental Protection Present Opportunities for International Cooperation)

Many of us won't be around in the year 2030. But, I don't think there's anyone here today who would say they don't care what the future is like for our children and grandchildren.

Those of us who will be living in retirement 20 or 30 years from now probably won't be too concerned about the energy supplies and operations of B. C. Hydro, the Bonneville Power Administration, or the utilities that serve us. But I don't think we would wish unnecessary problems on those who follow us in managing our utilities and energy resources.

Most of us will be gone by the middle of the 21st Century and won't be concerned about the environment of the earth then. But I don't think any of us are so thoughtless that we don't wish a healthy, clean world for our descendants.

Some of us may believe that we really don't have to worry about the quality of life, in the future that we have remaining in our lives. But, I believe that most of us truly care about what it will be like for those who follow us in the 21st Century; our children, and their children, and the children of our fellow human beings and neighbours around planet earth.

Most of us do care very much, and that's why we're here today to discuss what we can do - for our part - to help ensure that the world of the future is a place where those who follow us have the opportunities to live, and to grow, and to mature in a healthy environment.

There's an old saying that "charity begins at home." If we're going to be charitable for our home planet earth, we must begin by being charitable in our home regions and within our industry. Just as in the case of the virtue charity, our energy and environmental charity will have many rewards in itself.

That's why we're here today to discuss what we in the energy field, particularly electric generation and transmission, can do about the future - our home earth's future.

A central concern to our industry is energy supplies. But we have broader responsibilities than merely making sure we have many megawatts in the future. We also have a major responsibility to carry out our activities and plan our resources in ways that respect the environment. We have plenty of cause to be concerned about that, as we all know.

A serious problem facing the 21st Century is global warming form pollution of our atmosphere. It is caused by rapid increases in world production of the so-called "greenhouse gases" - carbon dioxide, methane, chlorofluorocarbons, and others.

The worst of those - and the one most related to electric energy production - is carbon dioxide which makes up nearly 50 percent of all the polluting gases. The U.S. alone is the largest producer of

CO2 - contributing 26 percent of the world's total production. The electric industry is the largest CO2 producer - at 35 percent. The primary sources of carbon dioxide are oil and coal, which make up a total of 67 percent (43 percent and 24 percent, respectively) of U.S. energy fuels.

From 1960 to 1987 production of all carbons in the U.S. and Canada increased by nearly 500 million metric tons, or 60 percent. It went from 835 million metric tons to 1.33 billion in 1987. North American electric utilities alone produce more than 465 million metric tons of carbon gases each year.

The gravity of the problem is such that it is getting more and wider attention by the various media.

Time Magazine's special year-end edition that normally features a noted man or woman of the year, last December focused on the planet earth as "planet of the year" because of the threat to our existence by global pollution. An article said "...the accumulation of CO2 in the atmosphere could drive up the planet's average temperature three degrees Fahrenheit to nine degrees Fahrenheit by the middle of the next century."

The article said "That could cause the oceans to rise by several feet, flooding coastal areas and ruining huge tracts of farmland through salinization." It warned of other environmental hazards facing us as a result, including: widespread destruction of forests, lakes and farmland from acid rain; continually expanding deserts; and global weather and precipitation changes.

The electric industry, environmental groups, and government institutions around the world are expressing concern and calling for future energy sources that have little or no emissions of carbon dioxide.

An article in the American Public Power Association magazine in December, 1988, said "The timing and severity of all three problems (global climate change, ozone depletion, and ground-level pollution) will be determined largely by the energy policy choices implemented over the next several decades." The article said "Ultimately...we must build our energy economy on sources...which have little or no net emission of CO2."

The World commission on Environment and Development that was established by the United Nations and that completed its work in 1987 has pointed the direction the world needs to take if we are to preserve our environment for future generations. The challenges the commission directed at us in the energy field constitute a significant portions of the overall threat to the earth - and of the opportunities to preserve our planet for our descendants.

I agree with the world commission's view that we are up to the challenge; and I think the energy interests of western North America are always responding to that challenge.

It was less than two months ago that B.C. Hydro Chairman Larry Bell, Canadian government officials, and others were in Portland to take part in a major symposium the Bonneville Power Administration co-sponsored on the future of power for the West. That was an important gathering of utilities, government representatives, and other energy interests from the Pacific Coast regions of western North America.

That was the first - and this is the second - of several interregional and international meetings planned for 1989 by various entities with interest in the future of electric energy in our regions. We from BPA are pleased to be here today to continue the dialogue with our neighbouring utility and neighbour country over the issues of our future energy supplies and our environment.

As important as our respective energy supplies are to us individually, I think it's even more significant that we've come together in a renewed spirit of cooperation, and with a desire to achieve more than merely meeting our basic future energy needs. That "more" involves a lot of other concerns and factors; ... the most efficient operations; ... the least costs and best savings to the people we serve; ... and, protection of our environment.

So, I'm particularly pleased to take part in this Forum with its theme of pursuing sustainable energy supplies for the future. And, I want to congratulate the leadership of B.C. Hydro for choosing that theme.

In studying the world commission's report, it's become apparent to us that BPA, B.C. Hydro, and many other utilities have been making serious efforts in a number of the directions called for by the commission.

To some extent, I believe we can congratulate ourselves for the strides we've made to date. But I think it's more important that we not rest on our laurels, that we keep up our efforts, and that we expand them to meet our energy supplies with a priority of conservation and environmental protection. To that end BPA is particularly enthusiastic about the possibilities we have with B.C. Hydro, with California, and with other regions of western North America.

Part of my assignment on the program today is to talk about what BPA has done - and plans to do - to achieve a sustainable energy supply for the U.S. Northwest. The best way to present BPA's efforts is to relate them to the challenges issued by the world commission.

As stated in the commission's report published last year in the book "Our Common Future," the overall challenge is for sustainable development. The report defined sustainable development as "that which meets the needs of the present without compromising the ability of future generations to meet their own needs".

In its basic challenges for future energy needs, the world commission said: "Future energy development crucially depends on its long-term availability in increasing quantities from sources that are dependable, safe, and environmentally sound". The commission identified four key elements of sustainable development:

- Sufficient growth of energy supplies to meet human needs;
- Energy efficiency and conservation measures, such that waste of primary resources is minimized;
- Public health; and
- Protection of the biosphere and prevention of more localized forms of pollution.

BPA's ongoing efforts and long-term objectives for resource development are similar, if not identical, to these and other factors outlined by the world commission.

There are four aspects of BPA's direction for its future energy supply. First - making best use of our existing resources. Second - aggressively pursuing conservation. Third - achieving the sizable opportunities that exist with B.C. Hydro and others. And, fourth - pursuing the overall challenges and opportunities we have through interregional and international cooperation.

Our experience of the past decade in the Pacific Northwest has proven the value of conservation to our region - both in terms of dollar savings for energy supply, and in minimizing adverse impacts on the environment.

We have been developing conservation first to meet future load growth, and through 1988 we've acquired more than 220 megawatts by conservation savings. That includes 120 megawatts in residential energy savings, 55 megawatts in commercial savings, and 45 megawatts in industrial and irrigation savings. The resources and environmental consequences of that conservation are substantial.

Over the last nine years BPA has had 32 conservation programs and demonstration projects. We have invested about $750 million on energy conservation. And, we plan to spend about $80 million per year for the next several years on energy savings.

Current BPA conservation programs for home and industry construction codes are expected to save more than 1300 megawatts by the year 2010. We conclude that there are between 1500 and 2000 additional megawatts of conservation savings that can be achieved in the U.S. Northwest. Those also happen to be our least costly opportunities for energy resources.

The environmental savings of all of these conservation opportunities are significant. Achievement of all of these possibilities by 2020 will result in a total energy savings of 3300 megawatts in the U.S. Northwest.

That would be the equivalent of reduced need for seven large fossil fuel generation plants. It would displace the need for more than 50 million barrels of oil or nearly 20 million tons of coal annually. The accompanying reduction of carbon dioxide - some 32 million tons - and other pollutants will be of tremendous value in abating pollution of the atmosphere, our land, and our water - in our region and the entire North American continent.

Let's look briefly in more detail at some of BPA's larger conservation efforts.

Residential retrofit programs of BPA and participating utilities have weatherized more than 200,000 homes in the U.S. Northwest. The energy savings of about 120 megawatts cost $480 million - less than an equivalent new energy cost from a nuclear power plant, and without any adverse impacts on the environment.

More than 5,000 buildings have been retrofitted under our conservation programs for existing commercial structures. The load growth reduction of 55 megawatts was achieved at a cost of about $100 million - again well below the cost of new nuclear energy and with no adverse impacts on the environment.

Our most effective conservation effort in the existing industrial sector is that with the aluminum industry. All 10 of our regional high energy-use aluminum plants are participating in BPA's 10-year conservation-modernization program. More than 40 megawatts of energy were saved in the first year of the program, for which BPA spend $1.9 million. We expect this program to provide 170 megawatts of energy savings by 1991. BPA will invest $100 million over the 10-year period, and the aluminum companies will invest nearly 4 times that amount.

Our more recent ongoing and long-term energy savings program is the new residential and commercial building. BPA is supporting efforts for region-wide adoption of model conservation construction standards. Those standards achieve savings of 40 percent in electricity use for home heating alone, compared to existing construction standards.

We have programs to promote such construction even ahead of region-wide and state adoption of the standards. In the past three years more than 7,000 homes have been built to those standards, and pilot programs by BPA have helped construct 100 commercial buildings that exceed these standards.

The report by the World Commission on Environment and Development said "The Commission believes that energy efficiency should be the cutting edge of national energy policies for sustainable development". The report said "Buildings offer enormous scope for energy savings, and perhaps the most widely understood ways of increasing energy efficiency are in the home and work place". It said "There are many examples of successful energy efficiency programs in industrial countries ... media information campaigns ... demonstration programs ... energy audits ... energy 'labelling' of appliances". And, the report said "The cost-effectiveness of 'efficiency' as the most environmentally benign 'source' of energy is well established".

From the experiences gained by BPA in our conservation efforts to date, we can verify the claims of the world commission about the economic and environmental values of energy conservation. And, the fact that BPA has been aggressively pursuing conservation efforts in all of the ways mentioned by the world commission - and then some - attests to our efforts for a sustainable energy supply for the future.

There should be no doubt that Bonneville Power Administration is serious in our view of energy conservation and efficiency as a major resource.

The world commission report said "Energy can often be saved cost-effectively by fine-tuning already functioning systems". And, it said "Both the routine practice of efficient energy use and the development of renewables will help take pressure off traditional fuels ...".

Both of those statements describe some of BPA's other present interests in resource options for the future. This goes directly to the efforts BPA and B.C. Hydro have underway. These efforts include negotiations on: (1) Coordination agreements for existing resources and operations; (2) Possible sale of future Canadian Entitlement power from Columbia River projects operated in the U.S.; and (3) Potential additional resources in British Columbia.

And we have several other possibilities as well. There are exciting developments in cogeneration that could make it a viable, primary source of new energy in the future. There are other interregional possibilities for capacity and energy exchanges - both in the U.S. and in Canada. Within the region we are preserving the Washington Public Power Supply System nuclear plants 1 and 3 in the event they are needed to meet future load growth. While not of immediate benefit, there are imminent technological improvements and breakthroughs in generation and transmission that could provide us with substantial energy efficiencies and savings in the future - coinciding with the time when BPA will need additional resources.

Let's look more closely at the specific opportunities BPA sees with B.C. Hydro. Through improved coordination between the two systems, we have the possibility for an increase of 300 average megawatts each for

BPA and for B.C. Hydro. That would come from existing resources and optimum management of them. The resources are in place in the Columbia and Peace River systems.

This is particularly attractive to BPA and other utilities and interests in our region for several reasons. The facilities already exist, and the net resources gain would come from within our established Columbia River system. There's a lot of certainty and reliability in that. No additional capital investment would be needed for generation or storage in the U.S. or Canada. And, there appear to be no incremental environmental impacts.

The Canadian Entitlement power is also attractive to the Pacific Northwest, and for similar reasons. There are other potentials for new resources in British Columbia that could provide energy for BPA and the Northwest on a sustainable basis with minimum environmental impacts.

We have a number of opportunities to meet the World Commission's challenges for sustainable energy development, through interregional and international cooperation in addition to those just mentioned. These involve B.C. Hydro, BPA and the public and private retail utilities of the Northwest, and California, and other possible utilities.

Some of the benefits are related to the energy resources themselves, including those already discussed. But a major benefit will come from another significant resource - the Pacific Intertie. It can be the means for much greater efficiency and savings through: (1) continued energy sales from existing resources; (2) future interregional seasonal exchanges; and (3) agreements for new renewable resources.

We realize that BPA has a significant role in this area - as the major Northwest transmission utility. We affect more than our own energy supply and operations, and as a U.S. Federal agency we have major responsibilities for general energy efficiency and protection of the environment.

B.C. Hydro and American utilities in the U.S. Northwest and Southwest are interested in our transmission system and possibilities for its use. BPA has been dealing with transmission issues for the past several years between the Northwest and California, and we are considering the transmission needs and benefits for all regions along the West Coast.

The operation of the Pacific Intertie alone - including the 1,000 kilovolt direct current line and the 500 kilovolt alternating current lines - can contribute significantly to optimum use of energy resources. The Pacific Intertie has been a major contributor to interregional energy efficiency and reduced environmental impacts since it was built in the late 1960s.

The direct-current line alone has carried as much as 8.5 million megawatt-hours a year. That's the equivalent of the power produced by normal operation of two large nuclear plants or four large coal plants. The energy sales moved across the direct-current have reduced the use of fossil fuels to generate electricity by the equivalent of 16.9 million barrels of oil - each year. The operation of the two 500 kilovolt alternating current lines has been even higher.

The intertie can help minimize needs for new resources and thus provide significant savings and environmental benefits in the future. The d-c intertie expansion that was completed in late April is an example. Its capacity increase from 2000 to 3100 megawatts provides the potential to reduce the use of oil and natural gas by an equivalent of 1.6 million barrels of oil annually - just in California alone.

After a planned third 500 kV alternating current line is added, the North American West Coast will have an even larger energy savings and conservation system in place. The future combined transmission capacity of nearly 8000 megawatts on the Pacific Intertie will be able to play a significant role in reducing needed fossil fuel generation. Its total capacity will be the equivalent of the generation from 15 coal or oil combustion plants operating at near maximum efficiency. The annual fuel equivalencies would be nearly 95 million barrels of oil, or 40 million tons of coal - almost 4,000 coal trains. The reduced environmental impact on our atmosphere could be as much as 70 million tons of CO2 - per year.

To the extent that the Pacific intertie has been and will continue to be used to maximize existing and new non-polluting electric generation, it will have significant benefits. Benefits for all our utility regions. Benefits for Canada and the U.S. And, benefits in our global contribution to reducing adverse environmental effects from energy production.

The World Commission on Environment and Development has identified many challenges for our future under policies of sustainable development - including specific directions for the future of global energy needs, some of which I've cited.

The commission's report contained a number of other advisories, among which are the following:

- "Energy efficiency can only buy time for the world to develop 'low-energy paths' based on renewable sources, which should form the foundation of the global energy structure during the 21st Century."

- "A safe, environmentally sound, and economically viable energy pathway that will sustain human progress into the distant future is clearly imperative. It is also possible. But it will require new dimensions of political will and institutional cooperation to achieve it."

- "Renewable energy sources could contribute substantially to ... a broader and more sustainable mix of energy sources ... but their development will depend in the short run on the reduction or removal of certain economic and institutional constraints to their use. These are formidable in many countries."

- "The Commission believes that every effort should be made to develop the potential for renewable energy, which should form the foundation of the global energy structure during the 21st Century."

It is important to remember that anything we do has risks and environmental consequences - as pointed out by the world commission.

From our first steps out of the Garden of Eden, or out of the sea onto dry land, human kind has affected our environment. Just as in any other pursuit in the world today and in the future, our efforts to meet our energy needs will have impacts on the environment. Every new energy resource potential has risks and environmental consequences.

Once we understand that, we need to make our choices and base our decisions on what has the least adverse environmental impact while enabling us to meet our energy needs. It seems to me that that is what is envisioned in the World Commission's goal and definition of sustainable development. And, I believe that describes the direction BPA is taking for our future.

I believe the West Coast of North America has unique opportunities for achieving sustainable energy supplies in the future, and for meeting the challenges and conditions described by the world commission. Between B.C. Hydro, BPA, and other Northwest utilities, we have the largest interregional system of existing renewable energy sources anywhere in the world - in our hydro projects.

We also have one of the greatest potentials for development of new sustainable, renewable energy resources. We have a major established and expandable transmission intertie system that can provide the means to maximize efficiency of existing and new resources through regional energy exchanges and sales among utilities along the West Coast of North America. And, we have a record and an established working relationship of cooperation.

A final statement by the World Commission on Environment and Development is worth noting in concluding my remarks. "Energy is not so much a single product as a mix of products and services, a mix upon which the welfare of individuals, the sustainable development of nations, and the life-supporting capabilities of the global ecosystem depend."

We have the opportunities to meet our respective future energy needs through interregional and international cooperation on a level called for by the world commission. We are major utilities with influence, with responsibilities, and with the ability to affect policy and major energy conservation by our actions and programs. Just like charity, I believe conservation begins at home.

Besides achieving our individual and collective energy needs, through international cooperation we can do our part - a significant part - in helping preserve and protect our environment. We will then be making bigger achievement - one for the U.S., Canada, and the earth. We will be passing on a future for the children and grandchildren of the world.

Questions Directed To Mr. Jim Jura:

Don Swoboda:

Well, Jim, we are running a little short on time, actually we are a little over but there are a number of questions that have come in and I think I would be unfair to those who have offered some considered questions to cut the meeting off. So I will try and rephrase a few of these for you. I have got four that relate to the subject of nuclear energy and I will just paraphrase them as follows: "What role will nuclear power play in B.P.A long range planning?" "Will B.P.A. encourage the resurrection of the two WPPSS nuclear projects if economically viable despite environmental and safety issues?" "Is increased nuclear energy use developing a part of B.P.A.'s future plans in the next 20 years?" "What is the future regarding nuclear energy in B.P.A?"

Jim Jura:

Okay, before I address each of those questions let me give you some background. The Bonneville Power Administration now has, at this moment, one nuclear facility that is up and operating at a 100-percent capability; that is the Washington Public Power Supply System Plant Number Two, WPPSS Number Two which is located in Richland, Washington on the Hanford Reservation. We have capability of 30 percent of the Trojan Plant which operates in the state of Oregon. We also have involvement with two plants, which one of the questioners referred to, two other WPPSS plants. WPPSS Plants One and Three are in what we call a state of preservation; they are not terminated, but they are there in case we need them. They are about two thirds complete; they are each in need of about three or four billion dollars to complete. Now I think the first question was; "How does Bonneville look at nuclear as a resource and what part will play in our future?" Well, I mentioned that the base generation in our region is hydroelectric, which varies in capability with stream flow. The last two years, I have come to understand how important the nuclear plants we have up and running are to us, as we have gone through two successive bad water years. I have been very glad that we have those nuclear plants on our system up and running because they have proven to be reliable and they have helped our system meet the load despite the low stream flows. We believe that the plants that we have in operation will continue to operate on our system. We think they are good, reliable resources, although they are expensive resources, compared with our other existing resources.

But we have them, and we are going to optimize their use. We are going to make sure that they operate in a safe manner, so we do not have the problems that you read that other utilities have had around the country and around the world with their nuclear projects. We believe that it is a viable resource for us. The next question was whether or not we will be taking any additional resources on and specifically will we be restarting Plant One or Plant Three? This is a question that we have in front of us. I mentioned earlier, that the law requires Bonneville, in resource acquisition, to line up our resources and match them against each other and to put tests to them. Economic tests, environmental tests and I know that under that system that with respect to these plants a couple of things will occur. One, that any restart or termination of those plants will be severely tested, any decision we make to start a plant will have to pass the strictest political test, legal challenge, and economic challenge that will come to us. In the Northwest, again from this 1980 law that I mentioned, we have a system, we have a Regional Planning Council that has representatives from the four Northwest states that is tasked by the Congress to provide an energy plan for the Northwest to meet its energy future.

Bonneville and the Council working together will determine whether or not it is prudent for us to restart one of those plants, or if it is prudent to terminate them. Right now, we are spending about 10 million dollars a year keeping them in the state of preservation; and we see that as an insurance policy. So it is hard to say at this point; I think I will, if I am invited back here next year at a conference, or if I am here two years from now; I may be able to tell you because of the way our loads are going, the way resources are going. I think it is possible we will be examining that question in a very major way in the next couple of years.

Don Swoboda:

Another question: "In view of the efforts in the United States, the Northwest to avoid thermal coal generation facilities, has B.P.A. any concerns about importing electricity from Canadian generated energy from coal?"

Jim Jura:

We have a similar situation within the U. S., and we have interests that within the U. S. that address this issue to us. Within the U. S., importing thermal resources from Montana, where there is a fair amount of coal generation, and delivering it into California or thermal generation from the Northwest into California or into the Northwest, sometimes these issues are addressed; and they get addressed in a number of ways. All with the same intent. The interest groups who are seeking to minimize the amounts of coal generation that is occurring anywhere in the U. S. have one paramount interest in mind; and that is the same interest that we have; is the most optimal development of resources. In the broad picture, as groups seek to influence us on that issue, I think the question will come down to "How should new resources be brought on line?" As you know in the United States we are now struggling with this very difficult issue of clean air and we know there are changes that will be coming to our existing coal plants. They are going to change over time, but we have a wide range of coal resources in our country, as I suspect you do, with efficient and less-efficient plants. There is going to be a lot of attention over here and you can bring pressure over here in a number of different ways. We feel some of that pressure already in light of the broad picture. Now the specific question of should we or should we not import energy from particular facilities in Canada is unlikely to arise. We view the imports as a system that we are dealing with. We think you will be approaching your issues in just the way we are approaching our issues in the U. S.; from a system point of view. I think it would be inappropriate and very difficult for us to chop out so many megawatts of sales from British Columbia.

Don Swoboda:

One final one, the previous speakers have equated a high standard of living to increase power capacity. "What do you consider is the criteria for a high standard of living?"

Jim Jura:

Well, I thought Mr. Strong last night made a good point when he talked about the standard of living and per capita energy consumption elsewhere. Japan, for example; many will argue their standard of living is already better or is exceeding ours. You have a wide difference of opinion there. But the fact is that their per capita energy consumption is very much lower than ours. But what I find interesting is the differences we have within the United States. Within the Northwest, our per capita use of electricity used to be almost double the rest of the United States. That is why Amory Lovins says we have this tremendous wealth out there that we can go after in conservation. We have a standard of living that most of us are very comfortable with. To protect that we have got to get that per capita use down. We can do that, and all we have to do is look to some of neighbours. In the Northwest we can look to other parts of the country; we do not have to look to Japan. We can see other parts of the country being more efficient in how they use the product than we are.

Thanks to Mr. Jura by Conference Chairman Don Swoboda:

Thank you Jim. It is my pleasure to thank Jim on your behalf, and the behalf of the sponsors of this Forum for taking time out of his very busy schedule and bringing us a perspective that I think is vitally important to British Columbia's current and future resource development as it relates to the energy field. Certainly we look to the south and appreciate that for many years they have been leaders in respect to the participation of the public in their resource development strategies and the electrical energy business. We appreciate your perspective on the issues we are dealing with here today. I might say that much of what we talk about regarding B.P.A. is export of energy from British Columbia in future. But as a utility manager, I think the history and our association with B.P.A. goes back many, many years and it has been a very successful and effective relationship in both a business sense and in a technical sense. I can tell you that the system strength, the electrical strength on the West Coast grid is the very thing that has probably prevented us from having disasters of the nature that other provinces and other parts of Canada have experienced. We, I think, have that strong association with the utility system to the south which really supports our system, so that we have not experienced the same kind of problems that Quebec Hydro has had recently and in the past. So I thank you, Jim, for coming up. We do enjoy hearing from you both as a utility expert supplier and as a good neighbour. We thank you for your presentation at the Forum today.

# QUESTIONS FOR JIM JURA ANSWERED AFTER THE FORUM

Question:

"Is BPA now reaching the limit of its ability to serve new industrial loads? If so, how will BPA respond to support economic development in its region?"

Jim Jura:

BPA is planning to meet all of the load growth of the public utility service territory at a minimum acceptable cost of power. In this way, we will be in support of the economic development of the region.

Question:

"Is there any prospect of the U.S./BPA repairing the damage to the Canadian anadromous fishery on the Columbia system caused by Grand Coulee et al?"

Question by: G. F. Kenyon

Jim Jura:

At present, there is little hope that an anadromous fishery can be re-established in the Columbia River Basin above Grand Coulee Dam. Previous efforts at passing juvenile fish through large storage reservoirs have failed. Further, the stocks of fish that were genetically adapted to the upper Columbia are now probably extinct.

Question:

"How are you addressing the anadromous fish issue and what benefit to the runs have been realized? What future plans do you have for protecting and enhancing the fisheries resource?"

Jim Jura:

The Bonneville Power Administration is implementing a major protection and mitigation program to rehabilitate the anadromous fish resource of the Columbia River. Since the early 1980's, substantial improvement in the fish runs have occurred, due in part to the mitigation efforts paid for by regional electricity ratepayers. BPA will continue its efforts to reduce the adverse effects of the hydro systems on the fishery and improve fish production in tributary sub-basins.

Question:

"Have you examined the environmental impacts of the various uses of electricity?"

Jim Jura:

No. While Bonneville has examined the impact of measures to conserve electricity (e.g. use of house-tightening combined with mechanical ventilation, disposal of PCB-containing ballasts when replacing inefficient lighting), it has not directly examined use impact.

Question:

"Surely, is there not a "limit to growth" with conservation? What do you do then?"

Jim Jura:

There is not really a limit to conservation. New energy-saving technologies are invented. New technologies become commercially available. New commercial buildings and homes are constructed and industries expand. All of these create new opportunities for improved efficiency in energy use -- i.e., additional conservation.

Question:

"What is your estimated annual load increment during the next 10 or 20 years?"

Jim Jura:

In the next 10 years regional loads are expected to increase by 2350 average megawatts (20 586 GW.h/a). In the next 20 years they are expected to increase 4965 average megawatts (43 490 GW.h/a) based on operating year 1988 actuals.

Question:

"U.S. PURPA regulations were enacted 10 years ago. Why is this described as "uptapped"; what barriers prevented implementation?"

Question by: Douglas Bruce - H. A. Simons

Jim Jura:

PURPA acquisitions ran afoul of falling energy prices which spelled lowered avoided costs for utilities affected by PURPA legislation. Utilities continue to resist PURPA acquisition on grounds of surplus capacity and overpricing. BPA is not subject to PURPA regulations, and as a consequence, BPA does not look to PURPA resources as a desirable acquisition path.

Question:

"Since the damage done to the environment occurred over 50 years ago in some cases, and is only now being acknowledged, how can we believe utilities when they now espouse the principal of conservation? Can we take them seriously?"

Jim Jura:

Utilities are espousing the principle of conservation because it is their least-cost resource. If the environmental benefits accruing to conservation are also acknowledged, the cost of conservation compared to central station generation is even lower. Environmental and other benefits to conservation are acknowledged in the Northwest Power Act, which allow a 10 percent cost-reduction credit to conservation in assessing its cost-effectiveness. The conservation resource is a measurable resource that can be dependably relied upon.

Question:

"Would BPA support the concept of independent, privately-financed new transmission capacity in Pacific Northwest?"

Question by: D. W. Ross

Jim Jura:

BPA's primary interests, regardless of ownership or financing, are to ensure that any new interconnection does not adversely impact the reliability of the power system nor degrade the availability of the existing transfer capability for BPA use. BPA is supportive of joint one-utility planning to avoid the unnecessary duplication of facilities. BPA would be supportive of a new interconnection meeting these criteria.

Question:

"Since BPA wishes to increase the efficiency of energy utilization, does that mean significant rate increases form part of that strategy?"

Jim Jura:

No. Under the Pacific Northwest Electric Power Planning and Conservation Act (1980) and the Transmission System Act (1974), Bonneville's rates are cost-based. Increasing the efficiency of energy utilization will help forestall the significant costs associated with acquiring a new thermal resource -- costs that would have to be recovered through revenues from rates charged to BPA's customers.

Question:

"Are you prepared to fund the flooding of B. C. river valleys to meet your needs and if so will you have to carry out environmental impact assessments in B. C.?"

Question by: Adranne Kevial

Jim Jura:

Bonneville is prepared to enter into financial arrangements that represent cost-effective mechanisms for acquiring power supplies sufficient to meet customer needs. In so doing, we must also be cognisant of related environmental impacts in those locations where impact could be expected to occur, including British Columbia.

Question:

"Is Bonneville promoting natural gas as a fuel of choice?"

Question by: Bruce Main

Jim Jura:

No. Bonneville does not have a mandate to encourage or to discourage natural gas usage. We are, however, considering gas-fired combustion turbines and cogeneration along with a wide variety of other types of resources in our 1990 Resource Program.

Question:

"Previous speakers have equated a high standard of living to increased power capacity. What do you consider are the criteria for a high standard of living?"

Question by: L. Herb

Jim Jura:

More goods and services at low prices and an enhanced quality of life.

Question:

"In view of the effort in the U.S. Northwest to avoid thermal coal generation facilities, has BPA any concerns about importing electricity generated by coal from Canada?"

Question by: Anne Edwards

Jim Jura:

Yes. A consideration of environmental impact is always an integral part of BPA's decision-making process. Before making a long-term purchase of electricity from a Canadian coal-fired generation facility, BPA would analyze the environmental impacts in compliance with the National Environmental Policy Act and Executive Order 12114 (Environmental Effects Abroad of Major Federal Actions).

Question:

"What role will nuclear power play in BPA's long range planning?"

Jim Jura:

WPPSS-2 and Trojan nuclear power plants are existing base load resources in the Pacific Northwest electric power system which BPA expects to continue operating. Completion of WPPSS-1 or WPPSS-3, which are respectively 65 percent and 75 percent complete, could ultimately be cost-effective. The projects are being preserved as potential options. There are no additional new nuclear plants planned for Bonneville's resource stack.

Question:

"Why should Canadians go into debt to supply cheap power to the U.S.? It's our environment that will be impacted."

Jim Jura:

It is Canada's decision, after weighing the economic costs and benefits, whether or not to develop new resources for power sales to the United States. However, environmental impacts in Canada would be weighed in any BPA resource acquisition decision.

Question:

"How has BPA dealt with the question of independent power producers and in what way has BPA addressed the environmental aspects of these private developers - has BPA made any internal reviews on these?"

Jim Jura:

Bonneville is not currently acquiring any new generating resources. Anticipating a future need, BPA is now developing an acquisition process. The biennial Resource Program will include environmental analyses of generating resources in general. Each specific future resource acquisition, including those offered by independent power producers, will be subject to a site-specific environmental review.

Question:

"Considering the rate at which U.S. and Canadian administrations have made headway on acid rain, is there any reason for optimism that any faster rate can be expected in dealing with "greenhouse" gases?"

Jim Jura:

BPA cannot speak on behalf of the United States Government to the national progress in dealing with greenhouse gases. However, BPA is closely following the scientific research on ozone depletion and global warming. An impact analysis of potential chlorofluorocarbons (CFCs) and greenhouse gas emissions will be included as part of the environmental review in our planning.

Question:

"Will BPA encourage the resurrection of the WPPSS nuclear projects if they are economically viable, despite environmental and safety issues?"

Question by: Niel M. Nielsen

Jim Jura:

A decision to complete WPPSS-1 or WPPSS-3 would fully consider all environmental (including safety), technical and economic factors.

Question:

"Is increased nuclear energy use a part of BPA's future plans in next 20 years?"

Jim Jura:

WPPSS-2 and Trojan nuclear powerplants are existing base load resources in the Pacific Northwest electric power system which BPA expects to continue operating. Completion of WPPSS-1 or WPPSS-3, which are respectively 65 percent and 75 percent complete, could ultimately be cost-effective. The projects are being preserved as potential options. There are no additional new nuclear plants planned for Bonneville's resource stack.

Question:

"How do B. C. Hydro's Power Smart and Resource Smart programs compare to Bonneville Power's comparable programs?"

Question by: Donald Scarlett

Jim Jura:

Power Smart and the Division of Resource Management's Energy Conservation Programs are alike in many ways. BPA and Power Smart have made new purchases of electrically efficient equipment (lost opportunities) their highest priority. BPA has also placed emphasis on resource acquisitions and efficient building programs. These projects are the second priority of the Power Smart program.

Question:

"How many thermal generating plants will be retired? How much hydro remains to be developed?"

Question by: Douglas Bruce - H. A. Simons

Jim Jura:

The Pacific Northwest receives power from nine coal-fired units and two nuclear plants. The oldest coal-fired facility -- Centralia -- was put in service in 1971; the oldest nuclear plant -- Trojan - in 1976. A large thermal plant can be expected to have a life of 30 to 40 years. This life can be extended with capital additions if it is deemed economic to do so and if current environmental requirements can be met.

About 400 average megawatts of new hydro-powered generation is forecast to be available to the Pacific Northwest. Most of this resource is small hydro development. In addition to the small hydro potential, about 100 average megawatts of efficiency improvements to large hydro facilities is forecast.

Question:

"How successful has your "Super Good Cents" program been to date? Has it met expectations?"

Jim Jura:

Yes. We expected a slow first year, rapid increases in year two, and a leveling off thereafter. We are holding steady at about 25 to 30 percent penetration region-wide. Many local areas are doing far better. Volume builders and multi-family developers remain the most difficult market to break into.

Question:

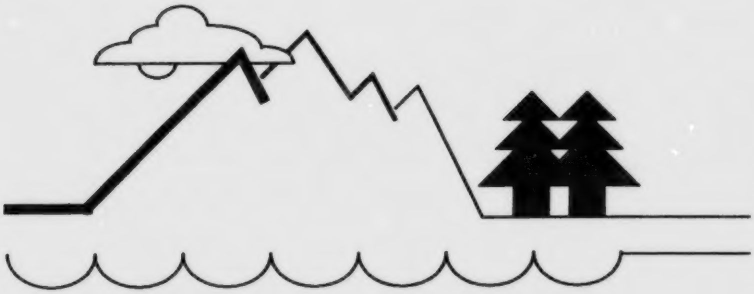
"The private energy sector in B. C. looks at your environmental assessment process as frustrating and onerous. Please present the benefits that accrue through the public participation facilitated by such legislation."

Jim Jura:

Public participation in environmental assessment processes serve to make decision-makers aware of the scope and intensity of public concerns surrounding potential actions. In this way, decision-makers can often address concerns before they create problems or lead to court challenges opposing proposed action.

# ELECTRIC ENERGY
FORUM

## Energy and the Environment



## LUNCHEON ADDRESS

SECOND ANNUAL ELECTRIC ENERGY FORUM
THURSDAY 11 MAY 1989
NOON

Introduction by Mr. Don Swoboda; Conference Chairman:

It is my pleasure to introduce today's luncheon speaker.

Monte Hummel is president of the World Wildlife Federation and he's also their chief executive officer, headquartered in Toronto. This Canadian arm is one of a network of 27 affiliated organizations around the world that comprise the World Wildlife Fund for nature, headquartered in Gland, Switzerland.

As many of you know his Royal Highness, Prince Philip, is the World Wildlife Fund's very active international president and he spends over one-third of his time on behalf of the W.W.F. The World Wildlife Fund has two basic objectives, and I will try to capture their essence as: The conservation of the natural environment and the maintenance of essential ecological processes and life support systems; or, in short, a sustainable world environment. In working towards this goal, the World Wildlife Fund has raised over 500 million dollars for 5,000 projects in 130 countries in only 28 years - truly remarkable achievement for which they should be justly proud. I note from reading the Fund's annual report that they have been very active in challenging the Muskwa River wolf control program in B. C. and obtaining in B. C. a moratorium on logging in the Khutzeymateen Valley to permit the study of its potential as Canada's first grizzly bear reserve. So they have been active in B. C.

Another item that caught my attention from that annual report was that the W.W.F. helped to obtain a postponement of a world bank loan to Brazil which would have funded dams that threaten 60 million acres of Amazonian rain forest. A comment I would make on that is that, hopefully, with a more enlightened approach to electrical energy development and its impact on the environment as we are discussing at this Forum, we will never see such drastic action needed here in B. C. The material you have in your packages identifies the extensive list of executive positions our speaker holds in wildlife and environmental organizations. He is also the author of numerous books and articles on the environment. Ladies and gentlemen, please join me in extending a warm welcome to Monte Hummel, our guest speaker for luncheon today.

# Restrainable Development

Monte Hummel
President of the World Wildlife Fund
Canada

# RESTRAINABLE DEVELOPMENT

I was pleased to accept this particular luncheon speaking invitation because I suspect I'm one of the few people in the room who was actually raised on a hydro power project. In my case it was in northwestern Ontario at Whitedog Falls on the English River, near the Manitoba border about 1,000 miles northwest of Toronto.

On the one hand, those were the best days of my life - quite literally a boy growing up in the bush, hiking, building forts, fishing and learning about wildlife because it was all around me....good memories those.

On the other hand, I learned that Hydro was virtually a law unto itself in the north, counted on to do everything from pulling trucks out of the mud to getting cats out of trees. I don't know it it's the same in B. C., but in Ontario where Hydro has been such an independent power it has made it difficult for the organization to adjust to changes, especially when the public criticizes it.... instructive memories those.

Finally, I remember the Whitedog Project flooding Indian graves. I remember coming back ten years later to see my former school friends from the Whitedog Indian Reserve out of work because mercury had contaminated the river, ruining both the sport and commercial fisheries which thrived while I was there. In this case, the mercury was from a chlor alkali plant bleaching pulp up river. On the spots where I used to guide fishermen as a kid, there were now signs displaying a skull and crossbones saying fish for fun only....sad memories those. More than anything else, those memories have been responsible for my twenty year involvement in environmental issues.

So, you see, I speak to you with mixed emotions today. I speak with some fondness, but also as a critic. Above all, I speak as an environmentalist, and I'm sorry to say, as someone who is developing a growing suspicion about the concept at the centre of this conference, namely "sustainable development." To be more precise, I'm suspicious about how this concept is being interpreted and used. I'm concerned that sustainable development is not restrainable development.

Sustainable development was succinctly defined by the national task force on the environment and the economy as "development which ensures that the utilization of resources and the environment today does not damage prospects for their use by future generations." Sounds benign enough doesn't it? And, I think we must never overlook its positive side, because sustainable development has won over influential people who were previously uncomfortable calling themselves environmentalists. At its best, sustainable development says we must take a conservation approach to those natural resources which we choose to develop. This means being good stewards of lands and waters by treating them as truly renewable. It means a conservation approach to forestry and farming. It means installing state-of-the-art anti-pollution devices on industrial processes everywhere. In short, it means managing our own behavior in relation to the environment as if we are here to stay, because this is the only earth we've got. So, sustainable development does promote an admirable ethic of responsible environmental management for that part of the planet which is going to be exploited by people.

But its emphasis on exploitation is precisely the reason why sustainable development has been so readily embraced by the resource sector, be it agriculture, forestry, mining or hydro. As such, sustainable development doesn't appear to challenge a more fundamental premise, namely that we should manage resources, lands and waters - every square centimetre if necessary. Therefore, the problem with this interpretation of sustainable development is that it fails to recognize the virtue of leaving anything alone. It easily accommodates a conservation philosophy which promotes wise use and regards the earth's biological diversity as natural resources spread out as stock or inventory for manipulation by people. But it has great difficulty with a preservation philosophy which says that some things should be kept safe, and not humanized, but left wild and valued as such. In fact, the preservationist's view has even been branded as anti-conservationist, as being contrary to the principles of sustainable development, for example when people like me advocate protecting wilderness areas and thereby withdrawing them from industrial exploitation.

I'm suggesting that those who feel their interests are threatened by a preservationest philosophy have particularly welcomed the concept of sustainable development. Granted, it obliges them to exploit responsibly, but at least it gives them a mandate to exploit! It further provides them with a tool to resist preservationists, while claiming to be respectable, modern environmentalists. Above all, it gives them a mandate to manage, to intervene into natural systems and to develop resources.

Now all of this may sound a little cynical, but I think it's serious stuff. Because if this is all sustainable development means, then I predict it will be seen for what it is, an emperor with no clothes. Or maybe the proper image is an emperor only partially clothed. Let's call it an emperor with his pants down. Certainly, I would not support such a concept. And keep in mind that I am a forester, that I was responsible for launching the world conservation strategy in Canada which predated, but contained all the basic philosophy of, the Brundtland Report which is now taken to be the bible for sustainable development.

But before you write me off as someone who was once sensible and has since gone astray, please read the Brundtland Report more carefully. Because that report states clearly that sustainable development does not mean managing every square centimetre of the planet. On the contrary, it says that preservation is an essential component of the sustainable development philosophy; for example, the Brundtland Report recommends tripling the existing protected area of our planet from approximately four to twelve percent.

Translated into Canadian terms, that means ensuring that at least 12 percent of our lands and waters should be legally protected as wilderness and not exploited industrially, not mined, logged or flooded, but left only to the forces of nature. Presently, approximately 6.3 percent of Canada has been legally reserved for parkland or wilderness. If we subtracted the area where mining, logging or sport hunting are permitted, we would be left with only 2.6 percent. Incidentally, the basis for these national numbers, as well as more detailed provincial data, will be published by WWF this fall in a book called Endangered Spaces. The basic premise of this book is that we have ten years left to reserve that 12 percent of wild Canada, or we will no longer have any choice in the matter. The option will be lost. So, grasping this opportunity must be part of the task for sustainable development in Canada over the next ten years.

The purpose of my talk today is to appeal for a more balanced conservation strategy that reflects both a conservationist and preservationist ethic. Let's put the pants back on the emperor. I'm arguing that sustainable development should not be opposed to parks preservation, or protectionism, or wilderness, but rather should include these things, as recommended by the Brundtland Commission itself. I'm saying that anyone who feels comfortable with sustainable development because it has finally put those wilderness crazies in their place, has not fully understood the concept. I want sustainable development to be restrainable development, to the tune of leaving at least 12 percent of our lands and waters in a wild state. In this regard, a 1987 Decima poll indicated 71 percent of Canadians feel that hydro electric development does permanent or temporary harm to wilderness. And residents of B. C. were well above the national average, reflecting the most negative feelings on this issue. A 1989 Environics poll for Forestry Canada indicated 75 percent of Canadians strongly feel our forests are a national treasure held in trust, while only 37 percent said they regard our forests as a resource for economic benefit.

I feel the broader, deeper, more balanced concept of sustainable development advocated by Brundtland and supported by the Canadian public has gone largely unrecognized by both government and industry to date. The recent federal throne speech, for example, went on at great length about sustainable development from the point of view of anti-pollution measures and building institutional think tanks. But there was no mention whatsoever of national parks or protected areas. Here in B. C., as a result of leaked documents from the Wildlife Branch, there has been a vigorous and, I think, healthy debate about whether or not sustainable development will simply be used to rationalize economic initiatives, or will it include responding to overwhelming public interest in protecting wilderness and wildlife?

Ladies and Gentlemen, I'm here to tell you that the buzzword credibility associated with sustainable development has already run its course. People are now looking for the beef. For B. C. Hydro, I suggest that putting the beef into sustainable development means four things from an environmental perspective:

The first point, I've mentioned already. It means respect and support for the establishment of protected areas, not a continual string of proposals which threaten them.

Second, it means emphasizing demand side management rather than supply side when it comes to energy planning. It has now become cheaper to save a watt than to generate a new one. This is entirely in keeping with the corporate mission of providing the cheapest power possible to the citizens of B. C., and it is accomplished, of course, through energy conservation. It's great to see B. C. Hydro's "Power Smart" campaign emphasizing precisely this point, and your new efficiency standards for electric motors. But I also note Premier Vander Zalm's recent agreement with the governor of Washington, the addition of an export arm to B. C. Hydro, and the view that B. C. has yet to tap 25 percent of its hydroelectric capacity.

Third, sustainable development means matching the form or grade of energy to the appropriate end use. For example, space heating with electricity has been likened to cutting butter with a chainsaw. In most cases, there are greater savings to be accomplished through improved insulation or weather stripping in cold climates, through the use of passive solar technologies in warmer climates, through more energy-conscious building design, and by using good old natural ventilation for cooling, rather than generating huge amounts of new electricity to accomplish these same tasks. I'm reminded of a cartoon from the New Yorker which shows a real estate salesman telling a young couple that this house has a brand new feature: windows that open. The point is that in many cases, the electric future simply flies in the face of common sense thermodynamics. Electricity by all means, but please, electricity only for the tasks done best by electricity.

Fourth, and finally, sustainable development for your organization means generally opening up B. C. Hydro to input from the public. That's the true meaning of all this rhetoric about "new partnerships and cross-sectoral co-operation." Remember what I said at the beginning about Hydro being a power unto itself? Well, the old days when public utilities in B. C., Ontario and Quebec ruled the roost are over. Ontario Hydro may have a better bond rating than the entire provincial government, but that does not make it immune to democracy, especially when its product touches virtually everyone's lives. I see no reason why the same principle shouldn't apply in B. C., and perhaps this conference is another encouraging step along the way.

In conclusion, I hope you don't feel I'm suggesting in some patronizing manner that all, or even any of this, comes as news to B. C. Hydro. I am suggesting that if you can make real progress on these four points, you will gain more and more support from the environmental community. I'm saying that if you care about our support, then sustainable development must prove itself to be a more fundamental and balanced concept which acknowledges a rightful place for wilderness and protected areas, for energy conservation, for a sensible end use energy mix, and for public involvement in your decision-making. Sustainable development must not serve as a fashionable hiding place to oppose such moves.

In a way, I guess I'm offering you an olive branch. As environmentalists, we can support your wish to use some of wild nature sustainable, on part of the landscape, and in the context of reasonable energy demand. But in return, will you support our wish to see at least 12 percent of the landscape left alone, even if that includes some wild rivers you'd like to dam? If not, then sustainable development will not go down in history as a concept which brought us closer together. Rather, it will have served to crystalize our differences.

Thanks to Mr. Hummel by Mr. Guy Rose, Director, B. C. Hydro:

Don Swoboda:

I would now like to call upon Guy Rose, director of B. C. Hydro to thank our speaker.

Guy Rose:

Well Mr. Hummel, you certainly kept us awake after dinner which is a real accomplishment because often after dinner speakers do not keep people awake. I am reminded that two thousand years ago there was a movement which started with some very remarkable conversions. I think Saint Paul was probably one of the most remarkable of these. We heard last night that Margaret Thatcher has also been struck along the road with another remarkable conversion and has become an environmental supporter. I think that there were a few prophets around that predicted this might happen. You were one of the prophets that has been predicting that the world has to become much more environmentally conscious and I think people like you have pricked our conscience.

I was glad when you referred to beef because that is what I do for a living. I produce beef and we do graze cattle in the mountains. I think, perhaps, we ranchers are now a little more careful than we used to be, and I would like to show you our range. I think you would be impressed.

But I am glad there is an environmental movement in the country and there are people of your stature who are concerned.

We are certainly concerned here at B. C. Hydro. Speaking on behalf of the directors, and I see one over here, Mr. Walsh, and on behalf of the chairman, we mean it when we say "that we have a commitment to environment." We still plan to keep the lights on, but we are on a new tack and the new tack reflects our conversion and the conversion is real. Thanks very much on behalf of all of us that are here today for your very constructive talk.

# ELECTRIC ENERGY

FORUM

## Energy and the Environment

## SESSION II: FUTURE DEVELOPMENT SCENARIOS

# SECTION 5

# SECOND ANNUAL ELECTRIC ENERGY FORUM

## 'ENERGY AND THE ENVIRONMENT'

THURSDAY 11 MAY 1989

## SESSION 2: FUTURE DEVELOPMENT SCENARIOS

1:00 P.M. - 3:00 P.M.

* B. C. HYDRO'S ENVIRONMENTAL GUIDELINES - MR. CHRIS BOATMAN
VICE-PRESIDENT OF CORPORATE & ENVIRONMENTAL AFFAIRS B. C. HYDRO

QUESTIONS DIRECTED TO MR. BOATMAN

* FORECASTS OF LOAD GENERATION & TRANSMISSION REQUIREMENTS INTO THE
21ST CENTURY - MR. KEN PETERSON, MANAGER POLICY & PLANNING B. C. HYDRO

QUESTIONS DIRECTED TO MR. PETERSON

# B.C.Hydro's Environmental Guidelines

**Chris Boatman**

Vice-President of Corporate and Environmental Affairs

B.C.Hydro

## SESSION TWO: FUTURE DEVELOPMENT SCENARIOS
## B. C. HYDRO'S ENVIRONMENTAL GUIDELINES - MR. CHRIS BOATMAN

### Introduction by Conference Chairman Don Swoboda:

To start the afternoon session our first speaker is Chris Boatman, the Vice-President of Corporate and Environmental Affairs and Executive Assistant to the Chairman of B. C. Hydro. As Larry pointed out this morning, Chris has responsibilities for coordinating all of the environmental issues within B. C. Hydro.

Mr. Boatman's recent career: in 1984 he was appointed manager of B. C. Hydro International, a subsidiary of B. C. Hydro involved in offshore consulting services. In this capacity he worked on research projects and hydroelectric projects in China, on the Yangtze and other river systems. In 1986, Mr. Boatman joined the office of the Chairman and Chief Executive Officer, and 1988 he was appointed President and Chief Executive officer of the British Columbia Power Export Corporation or POWEREX, as it is known, an agency to coordinate the export of electric energy from British Columbia.

Mr. Boatman is a graduate of the University of London in 1963, and holds a degree in civil and structural engineering. It is a pleasure to welcome a colleague of mine, Chris Boatman who will address the Forum on the subject of B. C. Hydro's Environmental Guidelines. Chris.

# B. C. HYDRO'S

# ENVIRONMENTAL GUIDELINES

CHRIS BOATMAN

VICE PRESIDENT, CORPORATE AND ENVIRONMENTAL AFFAIRS

B. C. HYDRO

Thank you very much Don and good afternoon ladies and gentlemen. As Larry announced this morning, he is giving me additional responsibilities. As I thought about those and what my remarks should cover, I would like to categorize it as trying to meet the environmental challenge while balancing the economic interests of today with those of tomorrow.

I think, as we sit here today, about our neighbors in the north, in Alaska who are still reeling from an environmental disaster which occurred some weeks ago. In fact, we should also reflect on the incident that caused a similar oil spill disaster off the West Coast of Vancouver Island not that long ago. The major oil spill in Valdez has had severe impacts on the environment of the Alaskan coast, but in addition it has severely damaged a corporate reputation.

Given these sobering examples on our doorstep, together with the many others we read about all too frequently in the media, how do we respond to the challenge of balancing the economic interests of today versus those of tomorrow? To me, the challenge is clearly one of social responsibility and corporate credibility. Those companies who considered the issue to be motherhood and intend to pay lip service to it risk their futures on a tide of regulatory and public backlash.
I think it is fair to categorize traditional corporate responses to environmental issues as reactive. Companies instructed their employees to do whatever was necessary to comply with environmental regulations, but did not tradionally encourage or create a culture for going the extra mile to exceed standards. An often-revealing indication of corporate commitment to the environment could be found by identifying the highest level in that organization with undivided responsibility for the environment.

Environmental policy formulation has been invariably a top-down exercise with minimum employee input into policies or budgets. In my opinion, a corporation that is seriously committed to environmental protection and wishes to earn the reputation for having this commitment needs to adopt the following strategic approach: it needs to identify and stay ahead of the issues, raise the environmental profile within the corporation, involve the employees in the development and implementation of corporate and environmental responsibility and to provide opportunities for public consultation throughout the process.

I would like to talk a bit about what B. C. Hydro has done to follow this strategic direction. To identify and stay ahead of the issues, we have to determine the issues that need to be discussed and resolved to provide this balance of economic interests. We have commenced public attitude surveys on an annual basis. These surveys have revealed some interesting points. While we are all aware of public concerns about the building of dams and transmission lines, we find that the most important issues are now those that provide risks to public health, such things as the transportation and disposal of toxic wastes, particularly PCBs, air and water pollution, and emerging concerns about health effects associated with electromagnetic fields.

Tracking is essential to monitor the changing concerns of the public on these specific issues. I would like to point out the changes we saw within the 12-month period. In 1988, when we did the first survey, water pollution was a major concern of 37 percent of the people; in 1989 it has risen to 54 percent. Concerns about the disposal of chemicals and PCBs was 28 percent, and now it is 43 percent. Concerns about the use and control of toxic chemicals has risen from 26 percent to 40 percent. Air pollution concerns have risen from 24 percent to 44 percent. Down at the bottom a year ago, the health effects of transmission lines was a concern to only 9 percent of the population; in 12 months that has increased to 15 percent of the population. So, I think it is very useful that we keep in touch that way to identify these issues. However, having identified the issues, now we must develop strategies and train staff to manage these issues, regardless of whether or not, we in the utility see them as real or perceived. In attempts to raise the environmental profile within the corporation we developed the following Environmental Policy Statement:

> "British Columbia has been endowed with a wealth of resources in a unique, and ultimately fragile, natural environment. It is both our corporate responsibility, and individual responsibility of every B. C. Hydro employee, to ensure safe, healthful, and sustainable resource development. Public and private decisions regarding electricity use must take into account all costs and impacts, including impacts on future generations. Full social cost-accounting will encourage smart choices between resource use and conservation, and an appropriate pace of resource development."

Accordingly, our Board of Directors has passed the following resolution:

> "In carrying out its business, B. C. Hydro will minimize adverse effects on the natural and social environment and actively pursue opportunities to manage our resources for the benefit of present and future generations."

I believe that clearly indicates to us, as employees, that our senior management at Hydro is committed to preservation of the environment. In addition, we have appointed a Director of Environmental Resources, reporting to the Vice-President of Corporate and Environmental Affairs which insures that he has input into corporate policy development, strategic planning, and resource planning. We provided him with a competent staff of technical people who are able to provide advice and guidance to our line managers. We have instructed our line managers of their obligation to consult with the Environmental Resource staff and advise them of subsequent decisions on all issues that affect the environment. I feel that we are putting these people in a very difficult role. We do not want them playing a policeman role, so the obligation is really on our line management to be sure that they do consult and advise the environmental group on all issues.

We have attempted to involve employees in the development and implementation of corporate environmental responsibility. I think that while we propose an environmental policy statement, corporate environmental responsibility is an attitude or a frame of mind requiring support from employees as well as management throughout an organization. It is not the global environmental statements and principles that matter, but rather the day to day attitudes and behaviour of employees from the Janitor to the Chief Executive Officer that will make or break a corporation's image with regard to the environment.

At B.C. Hydro, we want all of our employees to consider the environmental impacts of their day-to-day activities, I have struggled with that one, but maybe a few simple examples will give you an idea of what I mean.

All of our activities can affect the environment. I think of the purchasing agent when he is buying disposable cups. We would like him to think that if he buys styrofoam cups, he is creating a waste hazard problem. Should he buy biodegradable cups? Our engineer, who is looking at distribution lines supported on wooden poles, should think of where poles will be used when he is specifying the pole preservative. He should not specify preservatives that could cause problems by leaching into nearby streams.

One thing Hydro is good at is producing paper, so disposing of that paper is a problem. We are into recycling paper. Hydro now recycles 13 tons of paper per month from Head Office, mainly computer printout paper. We are looking to expand this into other paper products and we encourage other B. C. Hydro offices to do likewise. We are also examining the use of recycled paper. That is the frame of mind we would like all our employees to have.

As employees we say, that is fine, but at what cost? I am sure at this time there is no simple answer to that question. However, I am sure you would agree, it is not at any cost, but it will be a fundamental issue.

To aid in the process, we have proposed some guidelines for implementation. We are in the process of having them reviewed by employee focus groups. This process is intended to refine these guidelines into statements that employees find easy to remember, and can easily be translated into their day-to-day activities.

It is important to provide opportunities for public consultation throughout the process. If I can reflect for a minute, we must recognize that the public is getting involved more frequently in the actions or proposals of corporations, particularly those seeking government approval for their actions. As this happens, conflict is inevitable, but sometimes resources are squandered putting up a good fight rather than solving the problem. The challenge is not to eliminate the conflict, but to handle disagreements productively.

We have all seen in the past what happens when conflicts are not managed intelligently. Most move up in a spiral fashion, ever-increasing. First the problem emerges. For example, an organization announces a new development; this inspires curiosity and some concern. When the public asks for more information and gets an unsatisfactory response they become worried. The proponent's caution is interpreted as deceit and people choose sides. Soon positions harden and communication stops. Public discussion becomes public debate. Frustration, anger, and intolerance emerge. Then people do not want to hear the other side of the argument. Finally, a sense of crisis emerges, the community is divided, parties feel threatened, and increasingly they are interested in winning at all costs. They commit themselves to destructive retaliatory actions which they would reject in calmer times. The outcomes vary from expensive litigation, imposed decisions or even violence. I am sure many of us here have been involved in scenarios like this. A more productive approach is to determine the best solution cooperatively. The parties work towards a solution that all can live with, instead of a unilateral decision forced on them.

I would like to think this is the rationale behind B. C. Hydro's public participation program. These public Forums, which we started last year, are an integral part of that program. We have in draft form some mandates, goals and objectives for public consultation, and we would like to share them with you.

Mandates:

1. We want to ensure that the project will have a demonstrable and effective program of public consultation.
2. B. C. Hydro's public consultation program will identify and respond to community concerns in a pro-active and open manner.

Additional goals and objectives:

1. We want to foster understanding of the need for the project, and acknowledge the steps in the planning process.
2. We wish to provide ongoing opportunities for residents in affected communities and B. C. Hydro to exchange informations and views.
3. We wish to stimulate public discussion of alternative routes and siting options.
4. We want to achieve some measures of consensus regarding appropriate mitigation strategies.
5. We want to demonstrate B. C. Hydro's commitment to responding to community concerns in an open, honest and straight-forward manner.

Again, I would like to point out these goals and objectives as drafted here are not mandated by senior management, but have been developed by the staff who will manage their implementation.

Before I leave you, I would like to show you that these remarks are not just rhetoric. We have some experience in the implementation of some of these principles, with what I consider to be some success. We had a problem with a substation siting, near Lantzville, on Vancouver Island. We went about in a traditional manner. The public learned about the preferred site which we had selected and they objected. I think my first comment to Mr. Bell was, can we please ban the use of the term "preferred site?" We went back out into that community, we found half a dozen sites, we had two or three meetings in the community and low and behold out of that interaction popped a site nobody had considered; but it was acceptable to everybody.

Earlier, I mentioned the question of health effects of electric and magnetic fields. We have been aware of this potential problem for a couple of years. We recognize that it is an issue that we must bring forward in determining the right-of-way for the next transmission line. However, the issue jumped up at us on a line that is now under construction on the Island. How are we to react to this? It would be very simple to take the "null hypothesis", and say, "The jury is out on this one; there is no scientific consensus that these electro-magnetic fields are injurious to your health." We did not feel that was an acceptable position, so the position we took with the people affected by the line was to give them as much information as we had, allow them to assess that information, provide them with whatever guidance we could, and allow them to make individual choices.

Following the first of the employee focus groups we held to review these guidelines for employee input, we received a note from one of the employees, who said:

> "My thanks for the invitation to attend the focus group to discuss the environmental policy. I thoroughly enjoyed the opportunity to be part of a group of employees who are the first group to discuss this policy. As a concerned outdoors person, parent, and employee of Hydro, it made me feel that Hydro management is concerned and has a respect for our environment here in beautiful B. C. It is great stuff. Let's make Hydro the number one organization in our province to promote this concept of respect and concern. If this is the direction this company is heading, more employees I am sure, will feel pride in being a B. C. Hydro employee. Let's all work together for our environment."

So, I think we are slowly making steps in the right direction. It is my wish that this audience will provide us with comments on our environmental principals. We can then factor them into the final product. Copies of the documents I have discussed with you today will be made available to you during the workshops.

In conclusion, the principle message I bring to this Forum is my belief that the environment is not an issue that can be disposed of with pious platitudes. It needs to enter the main stream of corporate policy making. It is important that employees be enlisted in the process and "buy in" to the corporate position on the environment.

I read an article recently that suggested that ethics is good business, it is not so much the words as the process that is important, that is, by having a code of ethics that is communicated to employees, a company makes it known that it takes ethics seriously. I would suggest that we will find a similar correlation when it comes to the environment.

I would like to leave you with one final thought that I believe characterizes B. C. Hydro's commitment to the environment. What needs to be done will be done. Thank you very much.

Questions Directed To Mr. Boatman:

Don Swoboda:

A few questions, Chris: "Your Environmental Policy states that you will provide opportunity for public consultation throughout the process, should this not state that you acknowledge the obligation to incorporate public input into the process?"

Mr. Boatman:

O. K., I think the first wording defines a goal, the other maybe an objective. Certainly, I do not disagree with the comment.

Don Swoboda:

"How will B, C. Hydro specifically take into account social and environmental costs that are either intangible or do not lend themselves to being quantified in dollar terms?"

Mr. Boatman:

I cannot answer that question, I am not sure if anyone has an answer to that question. Those are some of the difficulties that we are going to face as we try to evaluate resource development, and do that balancing act that I was talking about.

Don Swoboda:

This one is related to the employees. "What specific avenues will be open to B. C. Hydro's employees who feel that the utility's actions are not socially or environmentally acceptable; for example, will they have to resort to whistle-blowing?"

Mr. Boatman:

Well, I am not sure if whistle-blowing is analagous to "challenging up"

I think we are definitely trying encourage employees to "challenge up." We see that as legitimate and in fact almost a mandatory requirement, so I do not know if you want to call those the same thing. If you equate the two, then fine, but certainly "challenging up" is something we want to see our employees doing.

Don Swoboda:

Maybe I can paraphrase three questions which are along the same subject: "Include the full social cost.... These are fine words, but vague. How will Hydro define full social cost, appropriate cost and other such generalizations? How do you determine the full social cost of your activities? Do you have a definition of social cost? Is the inclusion of social and environmental cost consistent with the principle of power at the lowest cost? How do you know how much the customer is willing to pay for environmental protection?"

Mr. Boatman:

Again, I see some people in this room who will remember us sitting for many months in Fort St. John discussing these issues. I am not sure we resolved them then, and I am not sure they have been resolved yet. What I was alluding to in my presentation was that we need to sit down together and find a solution to the answers to those questions. They are not easily defined. They are not easy questions to answer, but I think that was the purpose of my presentation. It was to say that they cannot be resolved in a vacuum by the utility or any developer. They need to be resolved in a Forum where everybody sits down to discuss them. On the question of social cost, Mr. Bell alluded this morning to the public attitude survey work that we did. It indicated that people are prepared to pay more for power while protecting the environment. Again, the questions that I expect our employees to ask is, "What is that cost?" "At what cost?" Again that is an issue that we can only resolve if we all sit down around the table with calm, clear heads and attempt to resolve it.

Don Swoboda:

"One of the public concerns today is the presence of dioxin in paper products. Fletcher Challenge have indicated that there is no market for unbleached pulp in Canada. Would B. C. Hydro be prepared to take the initiative one step beyond sending out waste paper for recycling and create a demand for unbleached paper by purchasing it?"

Mr. Boatman:

I alluded to that; we will be looking at it. It is something that we will continue to pursue, to see what areas are available in B. C. Hydro for use of recycled paper. We are committed to take a serious look at that concept.

Don Swoboda:

"Do you see public involvement at the earliest (i.e. overview) level of project studies?"

Mr. Boatman:

I certainly do. I think I made myself quite clear when I asked Mr. Bell to ban the word "preferred site." I do not see that as a way of doing business. Going out, having made up your mind, that message gets across to the public very quickly, that you are out to sell me a bill of goods, you have made up your mind already. This is not a two-way discussion, it is one-way discussion. The only way we can have a meaningful two-way discussion is right from the start.

Don Swoboda:

"What is Hydro's policy on compensation for impacts on the forest resource?"

Mr. Boatman:

We look at all of the resources affected by anything we do. There are guidelines developed by the provincial government. There are a variety of ways in which those impacts are determined. I cannot give you those policies off the top of my head.

Don Swoboda:

One final one, "Is it not rather glib to talk about considering impacts on future generations? How can we know what this is going to be? It is at best only an educated guess?"

Mr. Boatman:

You have answered your own question. But I hope that we can make intelligent guesses on long-term environmental impacts.

Don Swoboda:

Thank you very much Chris. We certainly appreciate, Chris, that you have come and shared the new and I think forward-looking environmental policy statements with this audience. These are guidelines at this stage and openly invited discussion at the workshops ahead. Chris, I think you face one of the most challenging areas in our business, certainly one that we have focused on by putting the environmental issues at a senior level in the corporation. I think that we have gone that first and very necessary step in declaring Hydro's position in that important area. Chris, thank you very much for joining us today.

# Board Resolution on the Environment

In carrying out its business, B.C. Hydro will minimize adverse effects on the natural and social environment and actively pursue opportunities to manage our resources for the benefit of present and future generations.

Exhibit 5-1

HYD 29 01

# Environmental Principles

1) Include consideration of the full range of natural, social and environmental impacts in all of B.C. Hydro's actions from initial planning and operations to decommissioning and disposal.

2) Promote a balance between resource use and conservation in providing B.C.'s energy needs.

3) Utilize presently developed resources to achieve optimum efficiency before developing new energy sources.

Exhibit 5-2 Sheet 1

HYD 29 02

# Environmental Principles

4) Pursue opportunities to replace in kind natural or social resources affected by Hydro's actions.

5) Promote appropriate recreational and commercial use of B.C. Hydro reservoirs, rights-of-way and other properties.

6) Develop an ongoing corporate-wide audit process of environmental performance, for regular review by the Board of Directors, to ensure that risks to safety, health and the environment are minimized.

Exhibit 5-2 Sheet 2

HYD 29 03

# Environmental Principles

7) Become a corporate leader in furthering awareness of local, provincial and global energy issues and actively participate in actions to deal with those issues.

8) Work with industry, government, public and other institutions to create and maintain a safe environment through a cooperative approach that shares information, knowledge and experience.

Exhibit 5-2 Sheet 3

HYD 29 04

## STRATEGIES

- Identify and stay ahead of the issues.
- Raise the environmental profile within the Corporation.
- Involve employees in the development and implementation of Corporate Environmental Responsibility.
- Provide opportunities for public consultation throughout the process.

Exhibit 5-3

# PUBLIC CONSULTATION

## PROJECT MANDATE

Ensure that the project will have a demonstratable and effective program of public consultation

## PROJECT PROSPECTUS

BC Hydro's public consultation program will identify and respond to community concerns in a pro-active and open manner

Exhibit 5-4

# GOALS & OBJECTIVES

- To foster understanding of the need for the project and the planning process
- To provide ongoing opportunities for residents in affected communities and BC Hydro to exchange information and views
- To stimulate public discussion of alternative routes and siting options
- To achieve some measure of consensus regarding appropriate mitigation strategies
- To demonstrate BC Hydro's commitment to responding to community concerns in an open, honest and straight forward manner

Exhibit 5-5

# Forecasts of Load, Generation and Transmission Requirements into the 21st Century

**Ken Peterson, Manager**

**Policy and Planning**

**B.C.Hydro**

## SESSION TWO: FUTURE DEVELOPMENT SCENARIOS
## FORECASTS OF LOAD, GENERATION AND TRANSMISSION REQUIREMENTS INTO THE 21ST CENTURY - MR. KEN PETERSON

Introduction of Mr. Ken Peterson by Conference Chairman Don Swoboda:

Our next speaker is another colleague of mine, Ken Peterson. Ken has been at Hydro since 1977 and he is presently the manager of Policy and Planning. The responsibilities of his division include rate design and administration, load forecasting, resource planning, and policy analysis. Mr. Peterson has extensive experience in economic evaluation and policy analysis of major issues such as long-term electricity export, flexible supply planning, and designing discount electricity rates to promote investment and employment. Ken received his Master's Degree in economics from Northwestern University following a Bachelor's Degree in economics from UBC. He also worked with Westwater Research Centre at UBC. I think his background and his current tasks at Hydro have more than qualified Ken to speak to us today on his subject of load forecasting, generation planning and transmission planning into the 21st century. Ken.

# FORECASTS OF LOAD, GENERATION & TRANSMISSION REQUIREMENTS INTO THE 21ST CENTURY

MR. KEN PETERSON, MANAGER

POLICY AND PLANNING

B. C. HYDRO

After hearing the speaker last night, and Mr. Hummel at noon today I think I am getting up here just in time. The available resources seem to be disappearing at a rapid rate. Maurice trashed coal last night, and I think Monte Hummel took Site C from us. I am not sure what we have left, but let's have a go at it and see what we can do. It is a pleasure for me to talk to you about this subject. In fact, people are getting suspicious about my eagerness to talk on this topic. Whenever anybody asks me, I say yes, because I think I have got one of the more interesting jobs in the province. Most of our linemen would disagree with me. They think it is more fun climbing poles. For a planner, this is one of the most exciting things you can do.

My topic this afternoon is resource planning (Exhibit 5-6): how we do it? What are our forecasts? What are our resource options? We invite you to participate with us in a series of workshops looking at the options we have, not only in the first ten years where our plans are reasonably fixed, but beyond that, beyond the year 2000, where there are a wide variety of things we could develop. B. C. Hydro's perspective is limited in terms of defining an appropriate course of development. This is where we need public input. We no longer have a layered demand forecast, resource plan, rate-setting exercise. We know very well that there is an interaction between these items. For example, rates impact on demand. We are now in an integrated resource planning process where we try to balance both the demand and the supply parts of the equation. I am going to present our objectives for integrated resource planning to you as follows:

1. Competitive pricing - This province has some of the lowest electricity rates in the country, indeed in the world. While that tends to raise consumption, it also makes us very competitive for industrial investment. One of our objectives is to hold electricity prices so that we do not stifle industry. We need to provide an environment where new industry can locate profitably.

2. Reliability - A reliable, high quality power supply is something that is a fundamental tenet of utility planning.

3. Appropriate mix of supply and demand-side options - This is new for utility planning purposes.

4. Appropriate mix of public and private sector development - We are increasingly aware of the opportunities for the private sector to come forward with cost effective generation sources such as co-generation.

5. Acceptable environmental impact - It is not for us at B. C. Hydro to determine what is acceptable; but we can do studies on it. We need the public's response to determine what projects are environmentally acceptable.

6. Manageable financial risks - A least-cost project developed at the wrong time may lead to very difficult management problems and risks: Either scrambling to pick up power from other sources that are high cost or trying to pay for a project whose full costs are on the books, but the demand to support it is not there.

Competitive pricing and reliability have been the hallmarks of planning for a long time, whereas looking at the appropriate mix of supply and demand is new. For example, if the cost advantage is one to seven in favor of demand-side options, let's make sure we have used up as much demand-side as we possibly can before going to the next available generation resource. Also, there are many smaller projects that a large-scale utility cannot exploit economically. We think that there are lots of ideas out there that the private sector can develop. In fact, we have placed a request for proposals that you will be hearing about tomorrow. We were surprised and pleased with the quality and magnitude of the proposals that we received. So those are the six objectives of integrated resource planning.

I have a number of slides that I would like to take you through this afternoon, culminating in a review of scenarios beyond the year 2000. The scenarios will then set the stage for the workshops in the last part of the afternoon and again tomorrow morning.

Maurice Strong talked last night about the strong linkage between economic growth and energy use. You can see this particularly in the case of B. C. There was a very strong correlation between electricity consumption in the province and the gross domestic product (Exhibit 5-7) right from the time that B. C. Hydro was formed. A one percent increase in G.D.P. corresponds to a 1.2 percent increase in electricity use. This relationship is not cast in stone; it is not something that will persist exactly at this ratio, but it is such a strong one that we must pay attention to it. Electricity is the fuel of a modern economy. We are now seeing what has been called the decoupling of the energy/G.D.P. relationship; oil is losing market share, for example. But there are many investments in this province that are electricity-intensive. For example, the shift away from kraft pulp to chemi-thermo-mechanical pulp. This shift is energy-saving, but electricity-enhancing. About double the amount of electricity is used with less opportunities for co-generation. In the residential sector we are continually confounded in our attempts to forecast accurately. People continue to find new ways of using electricity. We have predicted a downturn in per capita household consumption for some time and yet it holds steady and even increases. This results from a substitution of electricity for other energy sources and an increased use of electricity in new appliances.

Our first task as forecasters is to make an assessment of the economic growth rate. The provincial government, consultants, and past experience provide the basis for this assessment. The annual growth rate in gross domestic product in the late seventies was nearly 5 percent (Exhibit 5-8) and in the sixties it was even higher, but starting from a smaller base. In the eighties we had a prolonged recession from 1982 to 1987, and the growth was only 1.1 percent per year, on average. Our projections over the next few years are about 3 percent per year, 2.8 for the next 5 years and 3.1 percent beyond that. However, it is difficult to know for sure; the track record is not that good in forecasting economic growth, certainly not to a tenth of a percent.

The energy forecasters take the economic forecast as a starting point. However, we know that future economic growth is going to diverge from that and we have to be flexible in our planning. As a result, we make a range of forecast demands that we are projecting over the next 20 to 25 years (Exhibit 5-9). It is a wide range of possible outcomes when you consider that the low number corresponds to a very modest increase in overall electricity requirements and the high forecast corresponds to a doubling of our overall requirements. This is not beyond the realm of possibility. We have seen variations greater than this in the past and in the short term we may see excursions even beyond this range.

We see the range between the 2.1 percent and 3.5 percent as being more or less equally likely. That is, if we were able to forecast the probable economic growth of this province with reasonable accuracy at around 3 percent we could still see that range of outcomes in load and we would say we did a pretty good job of forecasting. Why is that? Because there is a wide range of electrical intensities of new investments that could occur in the province within that same growth band. This is the reality that planners have to assess and this is the reality that the citizens of B. C. also have to assess. There is a great deal of uncertainty about the possible outcomes for both the economic growth and the attendant electrical energy requirements. To give some comparative figures, even though the economy from 1982 to 1987 grew only at about 1.1 percent, electrical requirements for that period grew at about 4 percent. We have had recent growth rates on the order of 6 percent, and it looks like it will be close to or exceeding our forecast this coming year.

Another reality that we have to face is that, whether we are talking about projects or programs such as demand-side management, we are still left with very long lead times. In the case of projects, there is a long lead time between planning, designing, constructing and getting the project in service. In the case of programs, like those on the demand-side, a long lead time is necessary because of the number of people that have to make individual decisions which finally result in accumulated savings. In both cases we do not really know whether we are right until significant commitments have been made. A project such as Site C which has been engineered and that has been through the first phase of a hearings will still take 6 to 7 years from the start of construction. A large remote project like the northern rivers in this province could take anywhere from 12 to 15 years or more. So we are trying to match an uncertain load growth with a very long lead time for project development. Projects are not our only resource. The management of this problem of uncertainty and long lead times requires flexibility at both managing the shorter term projects and accuracy in monitoring the demand-side.

Now let's look at existing and potential major projects as a lead into looking at some alternative scenarios and the discussion of the plan (Exhibit 5-10). The G. M. Shrum and Peace Canyon dams on the Peace account for about 16 000 million kW hours or about a third of our existing capacity. Revelstoke, Mica and Seven Mile account for a little more than that. So the Peace and the Columbia development together account for over 75 percent of our average hydroelectric capability. When those projects were announced the Columbia River Treaty was signed and the Peace development was initiated, the province had an installed capability of about 10 000 million kW hours. In other words, the system expanded fivefold in a 25 to 30 year period, an enormous risk both financial and technical, but it was done. We have world class facilities in both our hydroelectric and transmission capabilities. That is, fortunately, the very strong base on which we are building. Some other jurisdictions are faced with mothballing aging thermal plants and wondering whether they are ever going to have the luxury of mothballing nuclear plants that have not started yet. The other hydroelectric projects that are indicated on the map are the Liard and Stikine. Each one of them are the size of the Peace or a little larger. There are also Elaho, Homathko, McGregor and Keenleyside/Murphy projects illustrated in this exhibit. Hat Creek Thermal in the south central part of B. C. is a large scale, low quality coal deposit that could be developed for thermal generation. The East Kootenay thermal project is in the southeast and would be based on a waste product. The fuel consists of coal rejects from metallurgical coal mining operations and/or thermal coal which is a by-product from these same operations.

These are the major options that could be developed over the next 30 years. It is comparable to what has been done in the last 25 to 30 years. It is an undertaking which is within our capability. We do have the financial and technical resources to do it. Whether we have the public support to pursue this kind of development is the question that faces us.

Another resource that is not indicated on here, because it exists south of the border, is the downstream benefits arising from the Columbia River Treaty. This is energy that is generated in U. S. generators from water stored in the Columbia Treaty Projects, Mica, Duncan and the Keenleyside Dams. These resources will revert to British Columbia about the year 2000 and will be available for domestic use at that time. They belong to the province and the decision has not yet been made as to how those resources will be allocated. They could be given to B. C. Hydro at some cost or they could be resold. As we look at the options we will be showing the impact of the return of the downstream benefits on meeting our load growth.

The transmission system associated with our generation is a very modern high quality 500 kV network (Exhibit 5-11). It was built largely to interconnect the remote generation sites and during that process of interconnection a grid emerged. We are now facing the necessity that load growth, particularly in the lower mainland, will require transmission additions that are not associated with generation, but they are needed to maintain our reliable, high quality supply.

Next I want to review our resource plan for the next 10 years. Besides major projects, other resources include purchases from other utilities and from developers in the province (independent power producers) and programs on the demand-side. As planners we array these in light of our objectives. The narrow band is existing hydro (Exhibit 5-12). Next we put in B.P.A. coordination. We are near an agreement with B.P.A. that would allow us to firm up some of our secondary energy, so we have added that to our base hydroelectric system. This is our firm hydro capability. Firm energy is energy that can be delivered from the hydro system under extreme low water conditions. These conditions have occurred about 5 years out of the last 40. You can see that we are very close to being short of energy right now. If we are relying strictly on our ability to deliver energy under low water conditions we would be needing to add resources. However, we also have the Burrard thermal plant, which is located very close to Vancouver; as well as a couple of combustion turbines which are not used extensively, but they are available for emergency on Northern Vancouver Island and at Prince Rupert (Exhibit 4-13). The main purpose of Burrard is to allow us to firm up secondary energy. Secondary energy is the energy that is available from our hydro system under better than critical streamflow conditions. It is an extremely valuable resource. In fact, we will probably be using it extensively over the next few years because of our load-resource balance situation.

Chris Boatman mentioned the number of battle-scarred veterans from the Site C hearings that he saw in the crowd. When we were at Site C in 1981 and 1982 we were talking about both the project impacts and the need for it. The Site C panel concluded at that time, that it was a project that could be built with acceptable environmental impacts, but that the need had not been demonstrated. It is informative to ask what would have happened if we had been able to convince the panel that we had a need for Site C in the late 80's. That project would be coming on stream about now. Would that be a disaster? I do not think so. I think it would give us a comfort factor. We would not be burning gas to support our reservoirs in low water conditions. It would not necessarily be the best solution. We think that the plan that we have now is better. However, 3-4 years ago, if we had gone ahead with Site C and were in the middle of the construction of Site C, and we had a huge surplus, the answer to the question, "Would it be a disaster for Site C to come on in 1989?", would have been, "Yes." This illustrates how quickly things change, how perspectives shift depending on the present economic outlook and current load growth.

What do we do next? The first thing is our Power Smart Program (Exhibit 5-13). We are stacking the resources as if they were coming on line at a certain in service date and all in a lump, but we should look at this as coming in over time. Power Smart is expected to deliver about 2400 million kW hours. That is the equivalent of about half of the output of Site C. We think that is conservative and that we can do better, but until we have monitored feedback on how well these programs are doing it is a prudent allowance. Next we have scheduled a purchase from Alcan upon completion of their Kemano project. They will sell power to B. C. Hydro for a 20 year period. This allows them to secure their rights to that resource in advance of needing it for smelter expansion which they plan sometime in the next century. We have also issued a request for proposals for private power development which would add about 1000 GW.h. Beyond that we would add the Site C project. Our resource smart initiative is also included here. Resource smart includes machining some of our existing projects such as the Keenleyside Dam and improving the output of other projects.

Under this plan the Keenleyside portion of the Keenleyside-Murphy project, together with Site C, would be completed about the year 1998 or 1999. We have let a contract for engineering these two projects to a state of readiness such that we could proceed with them on the basis of this timing if demand stays up or if some of other initiatives are not as successful as we expect. Conversely, if we are more successful in reducing growth than we forecast, we will delay these projects. This is the base plan to the year 2000.

We also have a transmission plan that goes along with the resource program (Exhibit 5-14). The 500 kV extensions are required both for increasing the transfer capability from the northern part of the province to the southern part and for enhancing the reliability of the system. The line from Prince George to Kelly Lake would transmit northern power (a combination of Alcan purchase and Site C). The line from Kelly Lake to Cheekeye is necessary to maintain system stability and reliability. We will also need an additional line from Nicola into the Meridian substation. We face some very difficult problems with future transmission expansion. To some extent, we have a bi-polar economy in this province. There is the growing economy in the lower mainland and southern Vancouver Island regions while the rest of the province is not growing very much at all. Most of our generation resources are outside of the lower mainland and increasing transmission through this bottleneck is going to be a tremendous challenge.

Next, I would like to present three hypothetical scenarios. Let's first look at a hydroelectric development scenario (Exhibit 5-15). I say that this is hypothetical because it is not part of a firm schedule. While we have looked at the hydro resources that are available and we have matched them to the demand in a fashion that would minimize the overall cost, we have not tried to assess the acceptability, the environmental impact, or the implications for managing the financial impact of bringing in some of these large projects. We would start off by finishing the Colombia River development. This would be Murphy Creek and Border Creek, fairly small projects, but significant resource additions.

Next, we could turn to some of the river basins that have not been developed as yet, the Elaho and Homathko in the southwest part of the province, and the Lower Canyon project on the McGregor. This would be a McGregor generation project, rather than the McGregor diversion project which was shelved, because of the environmental impacts on fisheries. The next project could be the Stikine Iskut, a very large-scale development, equivalent to the combined GM Shrum and Peace Canyon projects. It is far to the north, large and would comprise a composite of two projects on the Iskut, a tributary to the Stikine, and two on the Stikine itself. Long transmission lines would be needed to get the power south. Finally, the Liard, which is even bigger than the Stikine Iskut and less flexible because it consists of the output of two major projects. Our best guess is the Liard would have the equivalent of 12 years of domestic load growth at today's rate of growth. This would be difficult to manage financially without some other strategy to support it. For example, an export contract could take some of the surplus in the early years, which is in effect what was done with the original sale of the Columbia River Treaty downstream benefits. None of these projects in themselves are sufficient to meet the forecast requirement.

Now let's examine a thermal scenario (Exhibit 5-16). We start with small projects such as Municipal Solid Waste and include some wood-waste projects. They would take garbage or wood waste that is currently being burned in an environmentally unacceptable fashion and do it a little better. I think there is not, by any means, a consensus that burning garbage or burning wood waste and generating electricity is altogether benign, but it is better than our present alternative.

The East Kootenay thermal project would take the waste coal that is lying there and use it for electricity generation. Although Hat Creek is an enormous coal project that could support 5000 MW of installed capacity, the chart shows the capability that could be produced from a 2000 MW installation with 400 or 500 MW units. The project was studied extensively and then abandoned in the early to mid-eighties because of costs and because of the decline in load growth. B. C. Hydro still has the rights to the coal deposit. High efficiency gas turbines could be used to fill in the gap at the end.

Next, let's look at an alternative energy scenario (Exhibit 5-17). We start with our base plan and build as little as possible in the way of major projects. I caution you that in this development plan in particular, the resource stack makes very little sense because most of the emphasis is on managing the demand-side in one form or another. This development plan would be a mix of things that would accumulate over time. For ease of illustration I am showing you how they would stack up to meet the growth. We would start with a smaller-scale completion of the lower Columbia. This would take existing projects and put additional generation in them to enhance the output of some of these smaller projects. Any of the project developments in this scenario are considered to have minimal environmental impacts. The technical feasibility of energy conservation shown is several times the amount included in our current Power Smart Program. The technical potential is there and, through a combination of pricing and information, a good deal more can be realized. This is included as Power Smart II in the exhibit.

Indeed, if we can realize this potential before we make a commitment to Site C or other major projects, then we would prefer the demand-side management approach. There are small hydro sites around this province that could well be developed within acceptable environmental guidelines. Municipal solid waste and other co-generation facilities, burning wood wastes, black liquors or other fuels, are desirable from both an environmental and an energy production point of view.

Marginal cost pricing is another alternative. We estimate that if electricity were priced at the long-run marginal cost for resource development, the response of consumers to the change in the relative price for electricity would result in lower consumption. Our new projects are anywhere from 10 to 20 percent more expensive than the depreciated cost of existing projects. If we were to implement a program like this however, it would mean electricity prices would rise consistently faster than inflation over a long period of time.

Fuel substitution is a program that is now underway. We are promoting the use of natural gas where it is available as a substitute for electricity for both space and water heating.

Emerging technologies are a long-run alternative.

Those are the three scenarios that we would invite you to examine in the workshops with people from Hydro who will discuss them in a little more detail. The main purpose of their presentation at the workshops will be to review the scenarios and then listen to your comments on these various alternatives. These are all people whose main responsibility is to look into the future and make judgements about the course of development we should be recommending.

This has been a quick summary of a more in-depth study that we will be doing in the coming year on resource development beyond the year 2000. We intend this presentation to be the first of many in the coming year where we will talk about the plan and get public feedback. The next part of the program this afternoon and then again tomorrow morning is designed to get your feedback.

Let me conclude with a couple of observations. First, B. C. still has abundant undeveloped energy resources and abundant hydroelectric energy resources which makes us the envy of most jurisdictions. Second, there is no one right answer. The need for energy planning beyond the year 2000, requires that we start planning both major projects that would be developed and that we encourage demand-side management to be sure that we have the right balance of loads and resources in the future. I do not think that any utility planner would have difficulty making the choice between having too much or too little. All of us would probably err on the side of having too much. The actual development path that we will take will undoubtedly be different from any of those that I have outlined. We need your help in choosing the right mix of things to initiate. It is not B. C. Hydro doing this on your behalf. We are all in this together, initiating the development program that fits your needs, lifestyles, and expectations. Thank you very much.

Don Swoboda:

In view of the time and the fact that the discussion groups will be addressing the various issues that Ken has raised, we are not asking Ken to answer your questions at this time. Those that we have already picked up will hopefully be answered in the various workshop sessions. In the absence of that, answers to all of the questions that you have given to us so far will be provided in the Proceedings of this Forum.

## Thanks to Ken Peterson by Conference Chairman Don Swoboda:

I want to use this occasion to thank Ken for his presentation this afternoon. It is obvious that Ken not only brings enjoyment of his task as he describes one of the most interesting jobs in Hydro, but he also brings professional talent that I think provides a good deal of experience and understanding to a very complex and difficult task. You could also say that it is one of the most difficult tasks in Hydro.

## QUESTIONS ANSWERED BY MR. KEN PETERSON AFTER THE FORUM

Question:

"Given the need to conserve material resources and implement waste reduction and recycling programs, how can Hydro continue to promote waste to energy plants or describe energy from Municipal Solid Waste as "highly desirable from an environmental point of view"?"

Mr. Peterson:

I take it you think we should recycle everything and reduce the waste problem down even further. Well, I'm sure that will come. Some cities already collect glass, paper and tins with a separate pickup. But with sanitary landfill sites filling up all over the country, creating electricity from burning garbage is not a bad deal. The revenue from the electricity sale offsets the cost of incinerating the garbage, and the landfill sites take longer to fill up. It buys us some time until better recycling systems are devised.

Question:

"Will B. C. Hydro examine the production of hydrogen (through electrolysis) on moderate to large scale at plants which for any reason would otherwise spill or waste water energy? An example might be a reservoir storage dam (like Duncan) or a run-of-river dam which during times of the year cannot utilize the entire available flow.

Will B. C. Hydro coordinate and cooperate with West Kootenay Power (WKP) to more efficiently use B. C.'s natural (water) resources and prevent WKP from proceeding with wasteful gas turbine plants by providing secure capacity at a reasonable price? Would B. C. Hydro consider extending its March 1988's "Special Capacity Offer" for more than 3 years?"

Question by: Donald Scarlett

Mr. Peterson:

Hydrogen production: Maybe we'll install peaking generation at all of our storage reservoirs and in future there won't be much spilled water that can't be put through a generator. Second, it's difficult to store hydrogen. Maybe it can be kept in liquid form, but I think it's a long way down the road. Once we have vehicles running on hydrogen we'll need a lot of it.

Cooperation with West Kootenay: The March 1988 "Special Capacity Offer" for 3 years (1989/90, 1990/91 and 1991/92) was based on B. C. Hydro's expectation that Hydro would enjoy a capacity surplus until 1992. Pending coordination negotiations with BPA and Trans Alta may eliminate this surplus after 1992.

B. C. Hydro is prepared to coordinate and cooperate with West Kootenay for their power requirements after 1990. These negotiations are proceeding. It is WKPL's expectation that such negotiations should not be based on the marginal cost of new energy and capacity; but should be based on rates that would be offered to other B. C. Hydro customers (i.e. would reflect average costs). B. C. Hydro considers that it is unfair to its customers to sell electricity to WKPL at subsidized rates when WKPL's rates are lower than those paid by B. C. Hydro customers.

Question:

"Why does the 20-Year Plan not include the Columbia River downstream benefits mentioned by Jack Davis?"

Mr. Peterson:

The Columbia River Treaty downstream benefits are actually included in the 20-Year Resource Plan. Although not explicitly shown in the Recommended Plan, they are a potential resource beyond the year 2000 (see "Recommended Plan" on page 31), since most of their impact will take place then.

Further, the Plan indicates that the timing of Keenleyside, Peace Site C and the next resource additions will depend on the return or sale of the downstream benefits among other factors.

Question:

"Does B. C. Hydro have any plans to introduce peak and off-peak rates for industrial customers?"

Mr. Peterson:

B. C. Hydro is preparing to sample some customers to see if there is an interest in time-of-day rates. Since B. C. Hydro's generation is hydro-based, peak and off-peak costs vary by only 10 to 15 percent between different periods. As a result of this small variation, it is not certain that many customers will find time-of-day rates attractive. If there is an indication that such a rate will be useful to a reasonable number of customers, the rate will be introduced.

Question:

"Where can information be obtained on the hydrogen/air battery as mentioned by Jack Davis?"

Mr. Peterson:

The "hydrogen cell" that Jack Davis referred to is a hydrogen/air, solid-polymer fuel cell being tested at Ballard Technologies Corp. in North Vancouver. Dr. Davis described a possible application of this fuel cell as a power source for a bus. The hydrogen fuel would be stored in tanks on the bus in the form of methanol and converted to hydrogen as needed. The methanol can be made by steam reforming of natural gas.

Question:

"How do current forecasts treat this Vancouver Island Natural Gas Pipeline Project?"

Question by: R. A. Dougans

Mr. Peterson:

The latest long-term (1988) forecast assumed no major penetration of natural gas on Vancouver Island, i.e. that the gas pipeline project would not go ahead.

In assessing the impact of the gas pipeline on electricity sales on Vancouver Island, the residential sector is assumed to be the most affected with electric heating being replaced by natural gas. Some impact on the commercial sector is also assumed. No impact on electricity sales to the industrial sector is expected.

Question:

"Are your load forecasts and those of the Ministry of EMPR essentially in agreement? If not, how do they differ?"

Question by: J. D. Chapman

Mr. Peterson:

The Ministry of Energy, Mines and Petroleum Resources (MEMPR) has not released an official long-term load forecast since August of 1986. At that time their estimated long-term average annual growth rate on B. C. Hydro's integrated system was in the 2.0 percent per year range.

Latest indications from MEMPR are long-term perceived average annual growth rates for total electricity requirements within B. C. in the 2.0 percent to 2.5 percent range. Growth on B. C. Hydro's integrated system would be somewhat higher (i.e. in the order of 0.2 percent to 0.4 percent per year more).

B. C. Hydro's latest long-term forecast (1988) shows long-term growth rates in the 2.8 percent per year (average) range.

This indicates that the long-term outlook of MEMPR and B. C. Hydro are similar, with MEMPR's marginally lower.

Question:

"The nuclear power option was hardly alluded to. Shall we not still use it as an option to consider?"

Mr. Peterson:

Given that we have to allocate our time and studies budgets to the most promising alternatives for future electric supply and given the climate for nuclear power, especially in B. C., we do not consider it prudent to maintain the option. If circumstances change we will use consultants to revitalize our data.

Question:

"Have we considered sufficiently the consequences of not encouraging new industry through favourable electricity rates?"

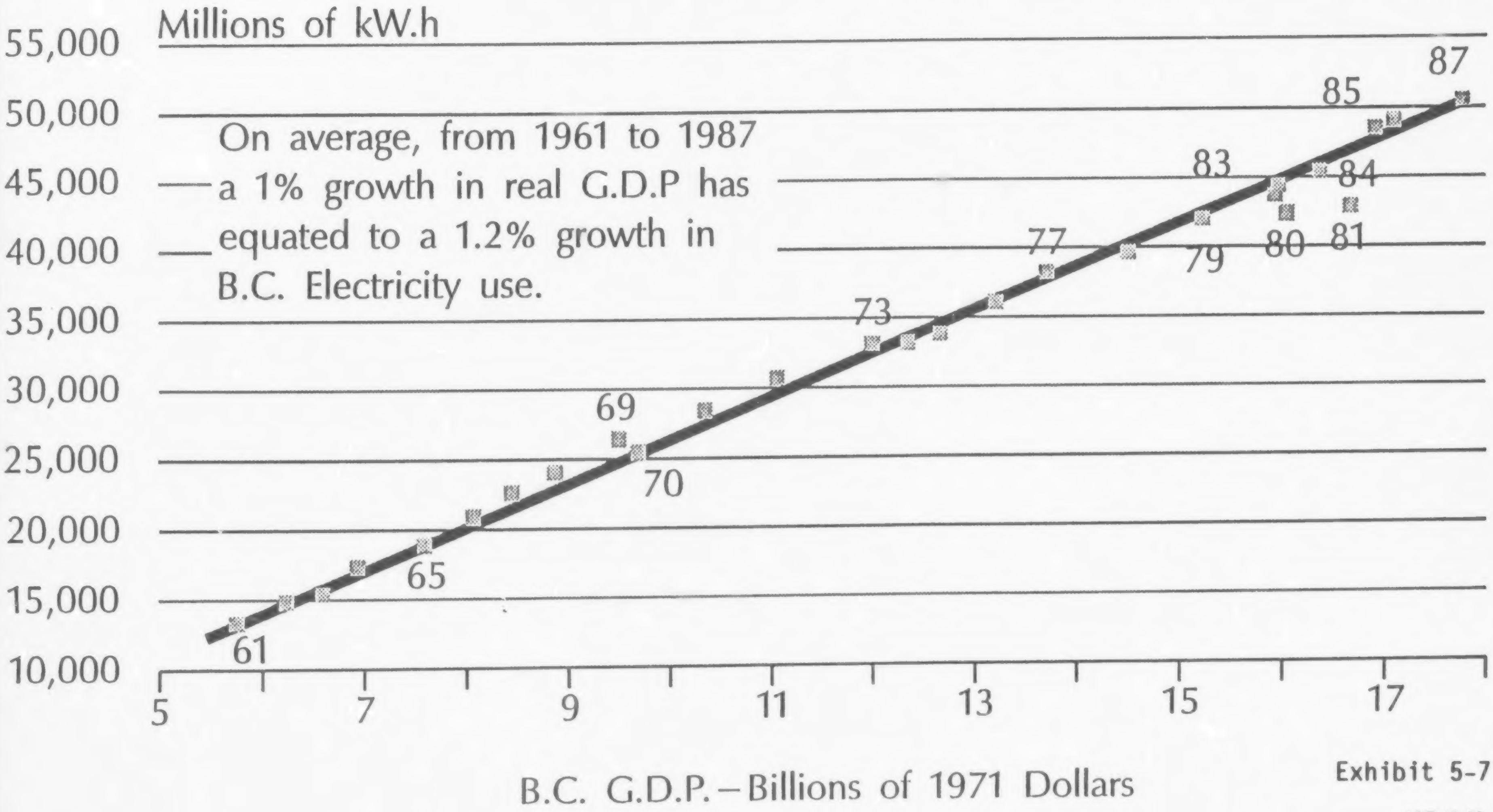
Mr. Peterson:

One of the choices B. C. as a whole has to make is how to use the energy resources it has: power-intensive industry is one choice. We have relied on large consumers of electricity for our economic growth to date in the forest and mining industries. We need to look carefully at the pros and cons of this type of development in the future in conjunction with our electricity development plans.

# BC hydro
# Resource Planning

Exhibit 5-6

# Electricity Consumption vs. G.D.P. (B.C.)

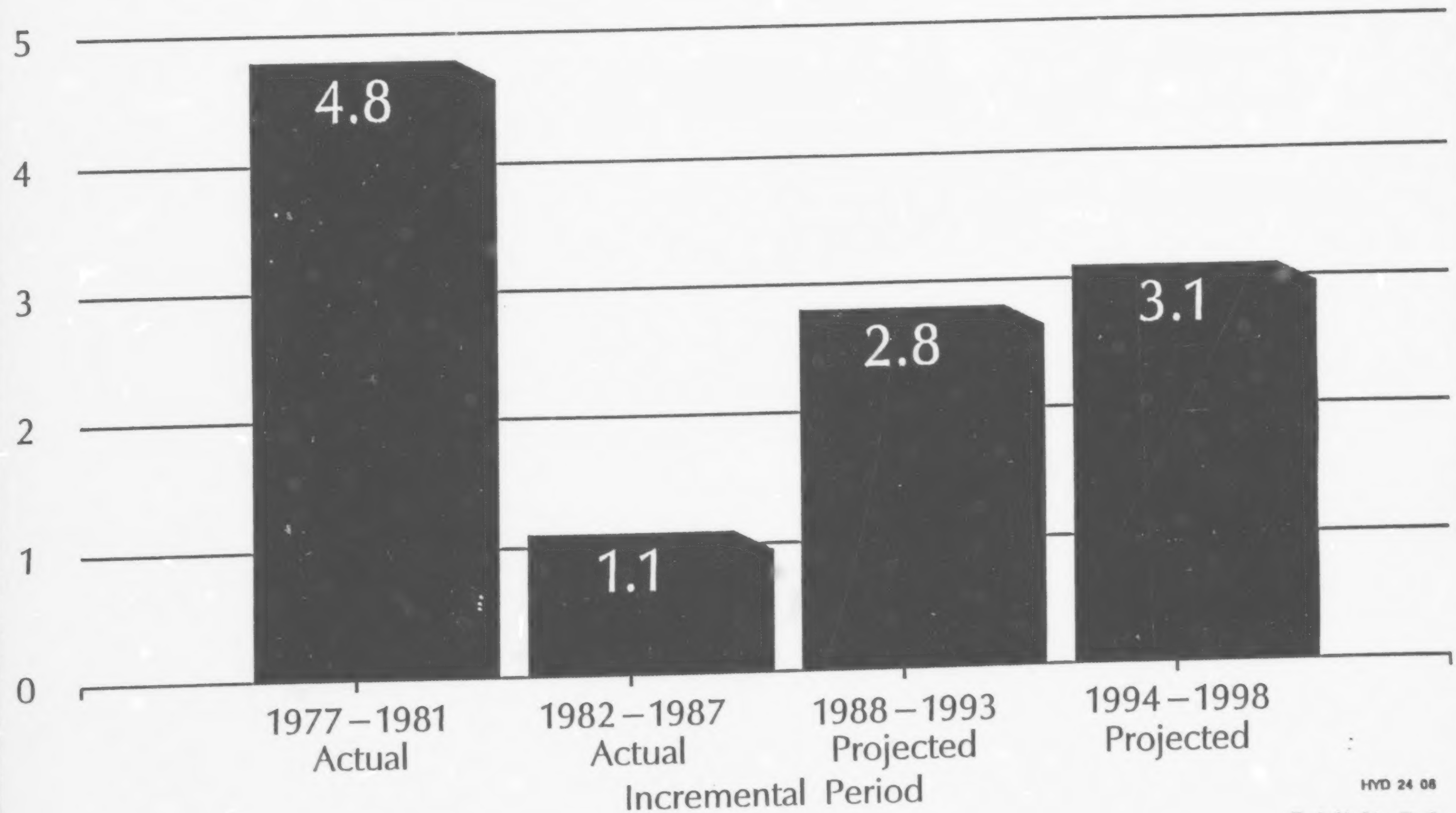


On average, from 1961 to 1987 a 1% growth in real G.D.P has equated to a 1.2% growth in B.C. Electricity use.

Exhibit 5-7

HYD 19 06

# B.C. Domestic Product (G.D.P) Average Growth Rate (%/Year)



HYD 24 08

Exhibit 5-8

# Range of Forecast Demands

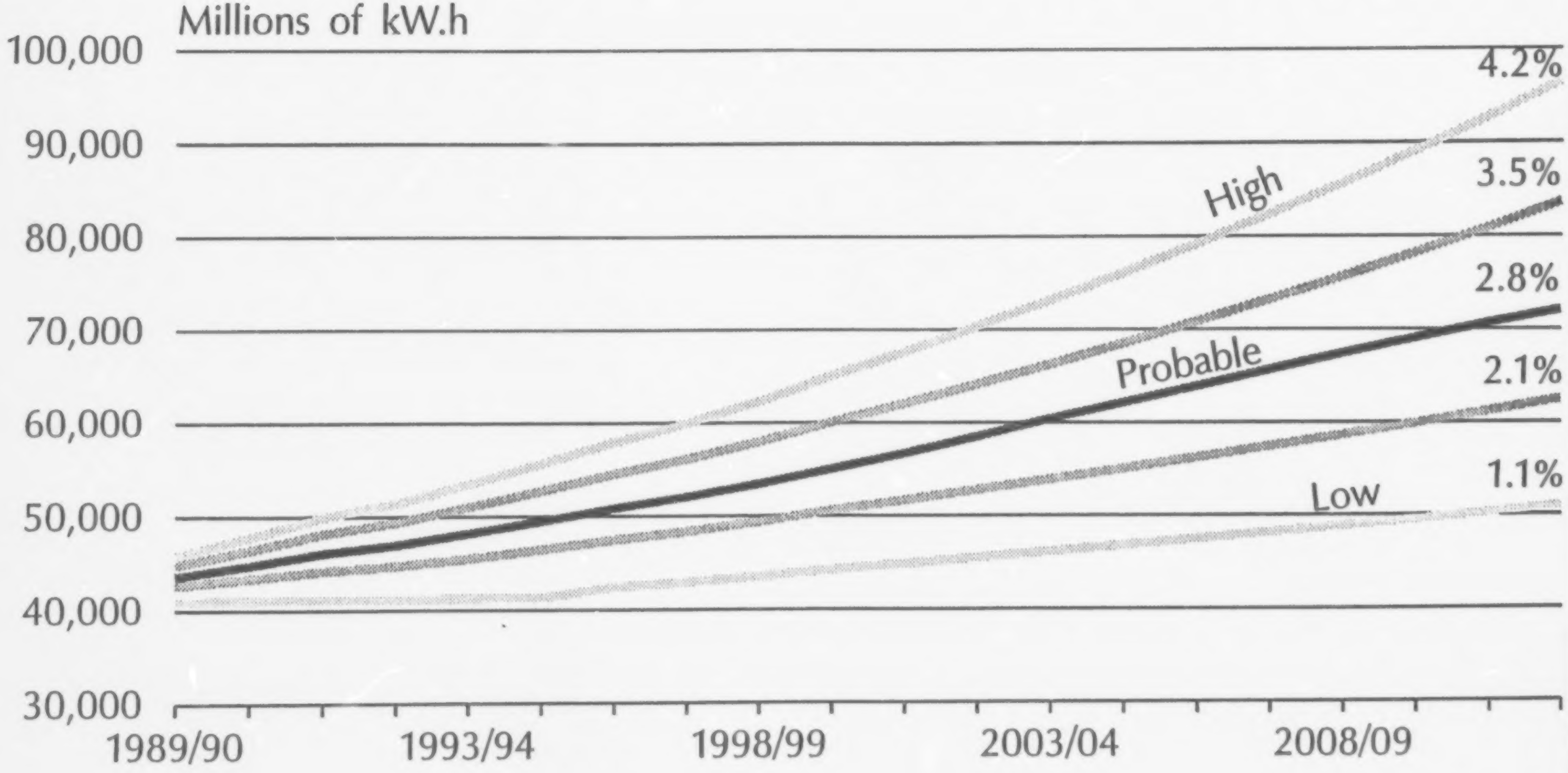
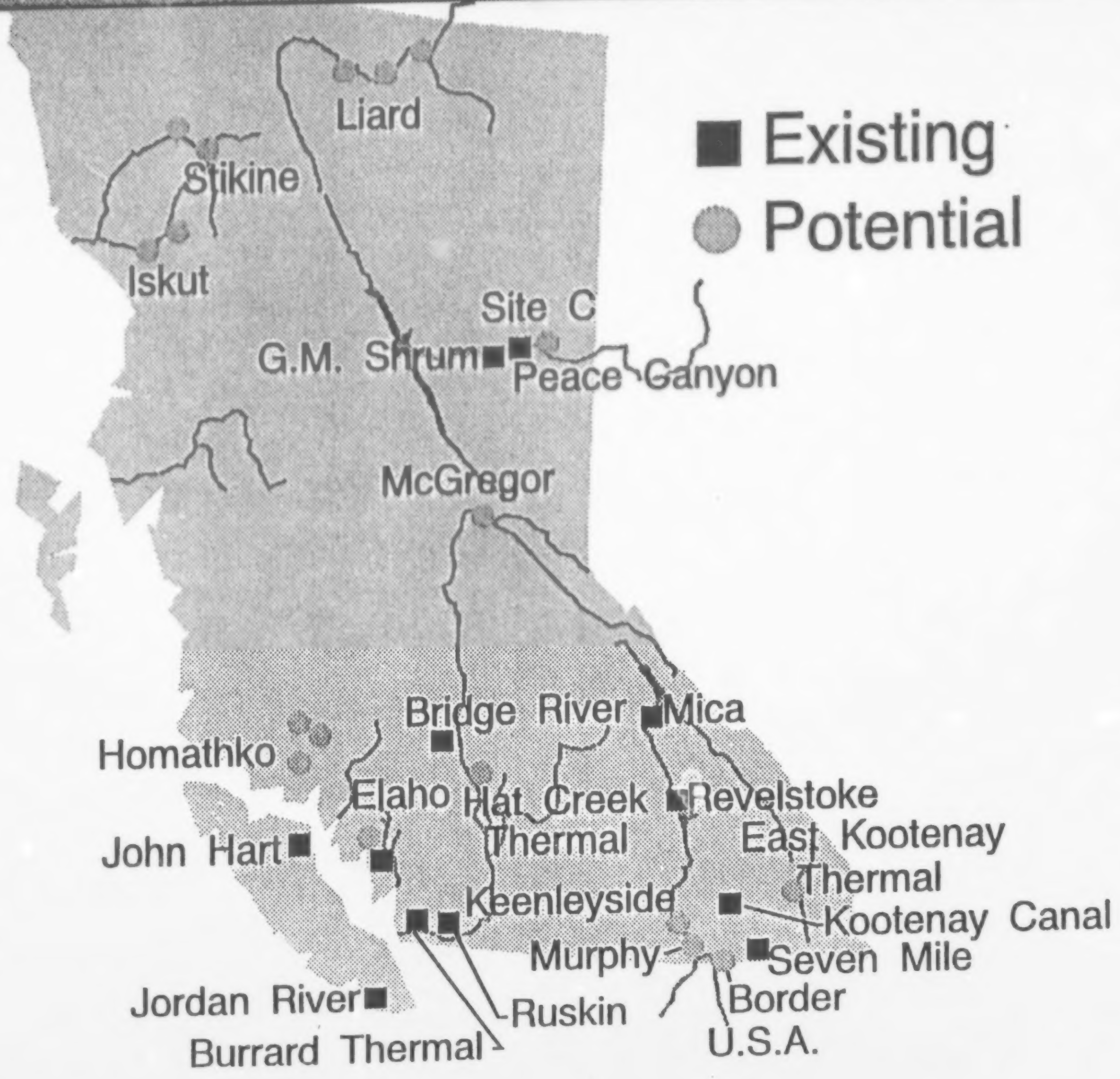


Exhibit 5-9

HYD 19 07

# Major Generation Projects


■ Existing
● Potential
Liard
Stikine
Iskut
Site C
G.M. Shrum
Peace Canyon
McGregor
Bridge River
Mica
Homathko
Elaho
Hat Creek Thermal
Revelstoke
East Kootenay Thermal
John Hart
Keenleyside
Kootenay Canal
Murphy
Seven Mile
Jordan River
Ruskin
Border
Burrard Thermal
U.S.A.

HYD 24 08

Exhibit 5-10

# Existing Transmission System

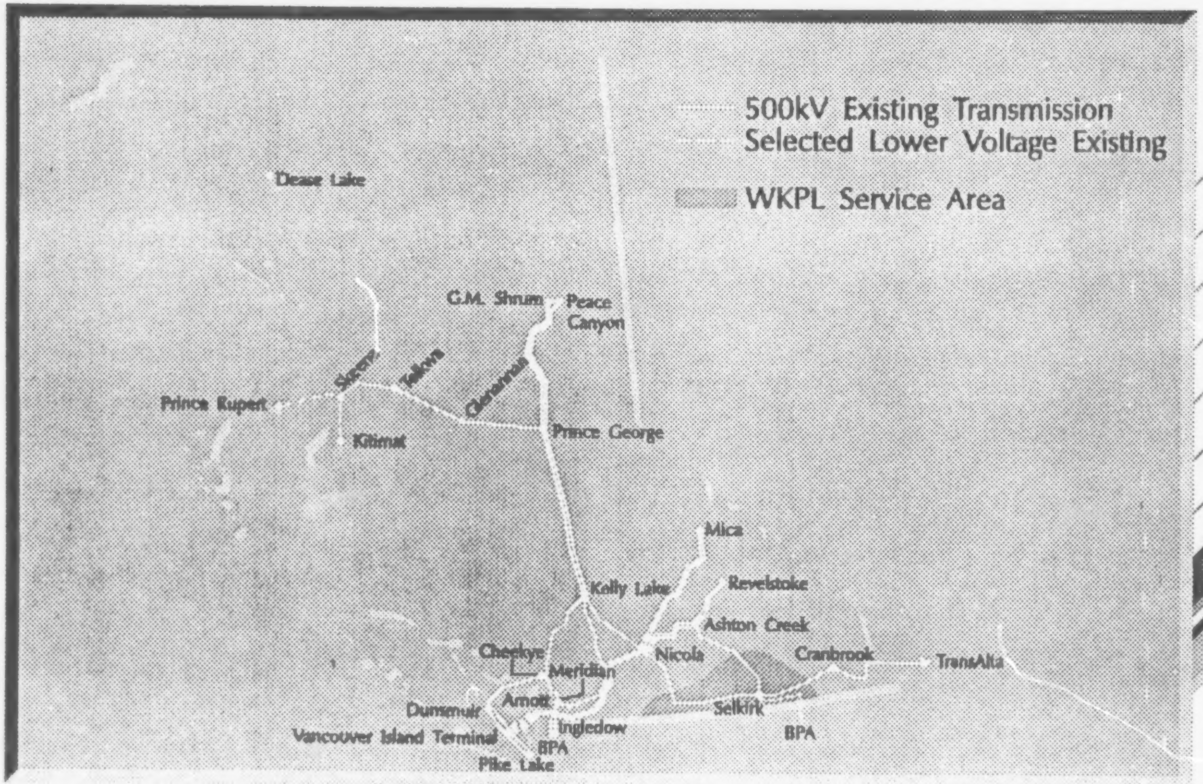

500kV Existing Transmission
Selected Lower Voltage Existing
WKPL Service Area
Dease Lake
G.M. Shrum
Peace Canyon
Skeena
Telkwa
Glenannan
Prince Rupert
Kitimat
Prince George
Mica
Kelly Lake
Revelstoke
Ashton Creek
Nicola
Cranbrook
TransAlta
Cheekye
Meridian
Arnott
Dunsmuir
Ingledow
Selkirk
BPA
Vancouver Island Terminal
BPA
Pike Lake

Exhibit 5-11

# 1989 Resource Plan
# Firm Energy Capability

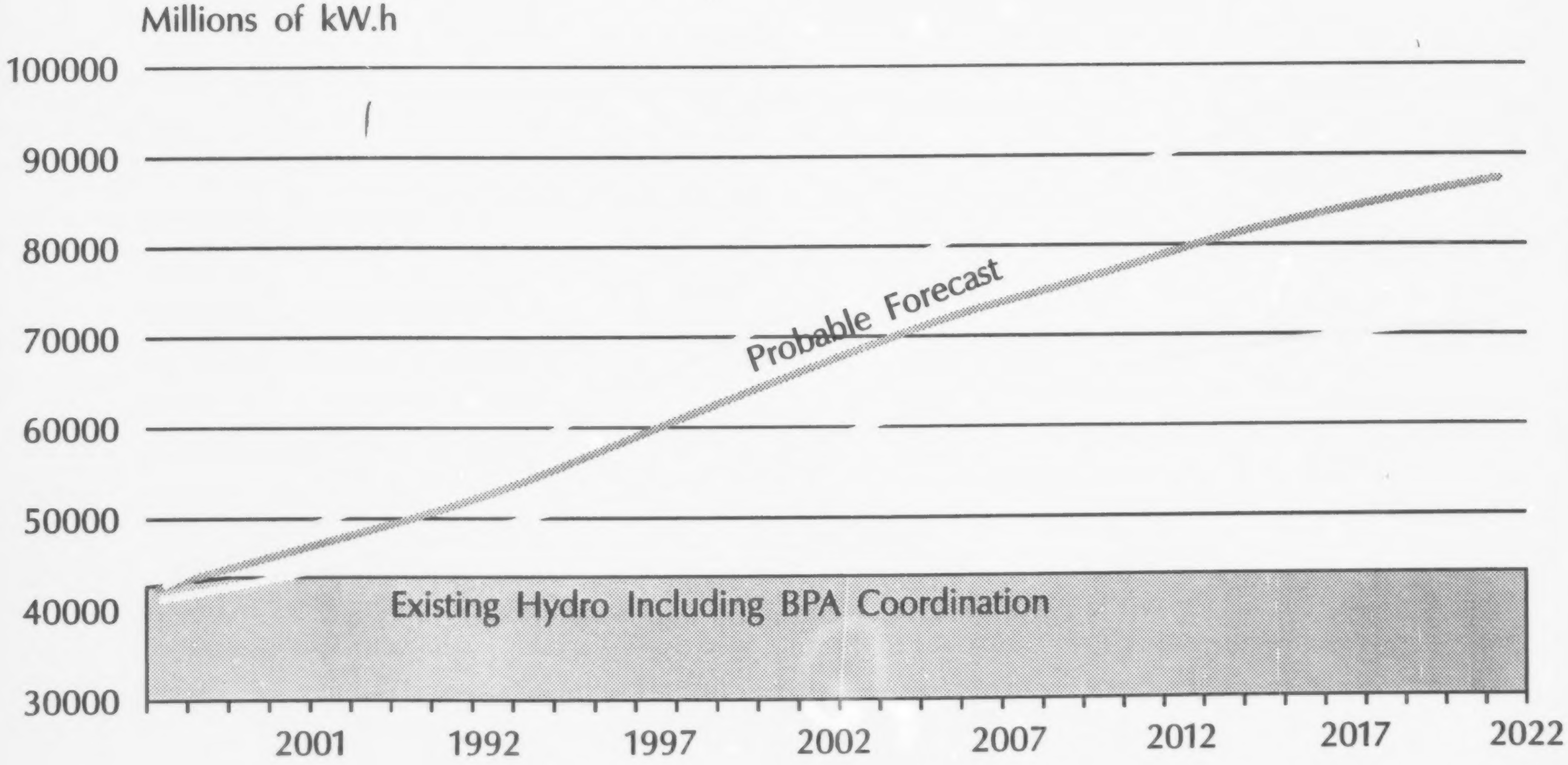


Exhibit 5-12

HYD 33 02

# 1989 Resource Plan
# Firm Energy Capability

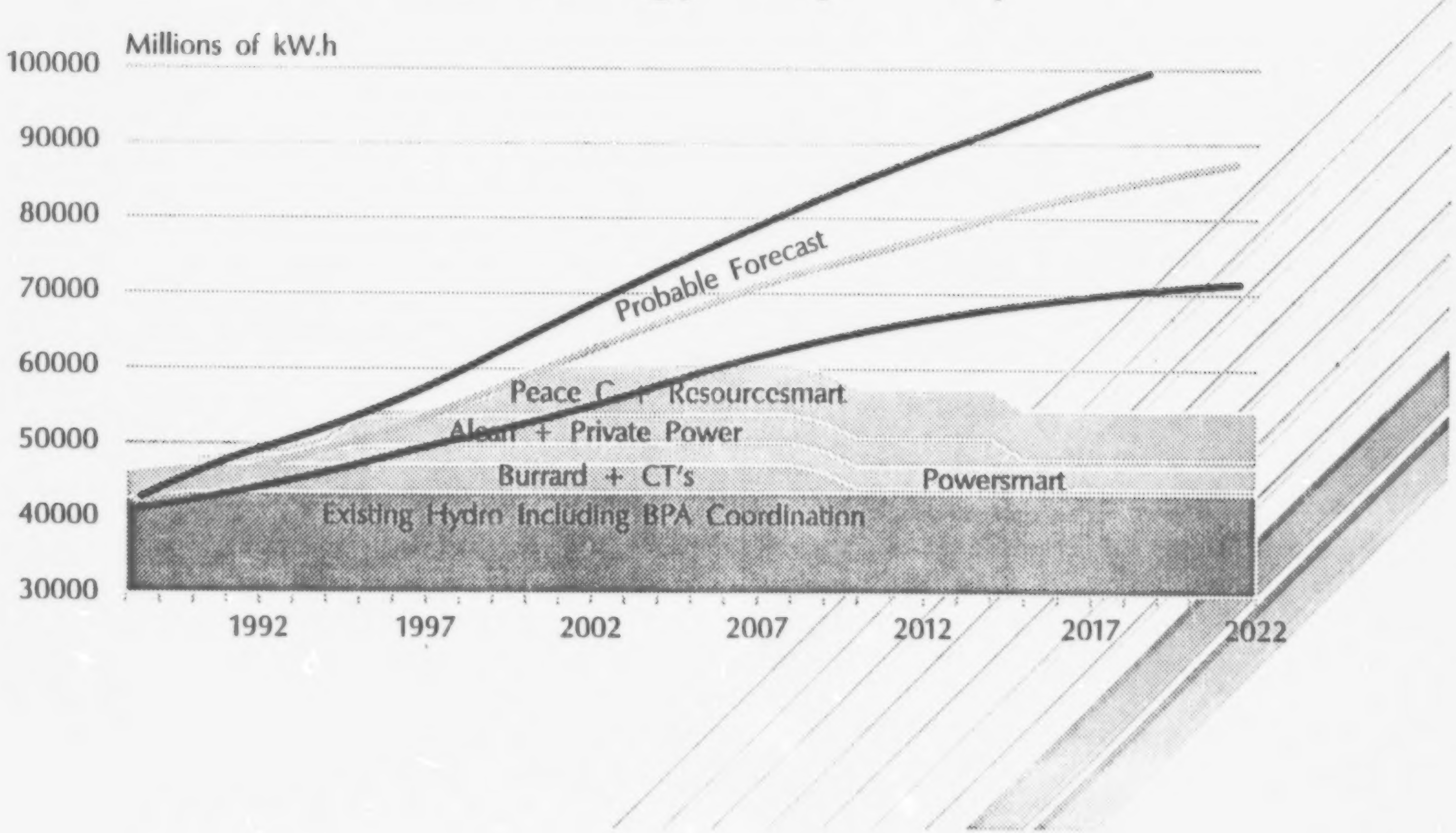
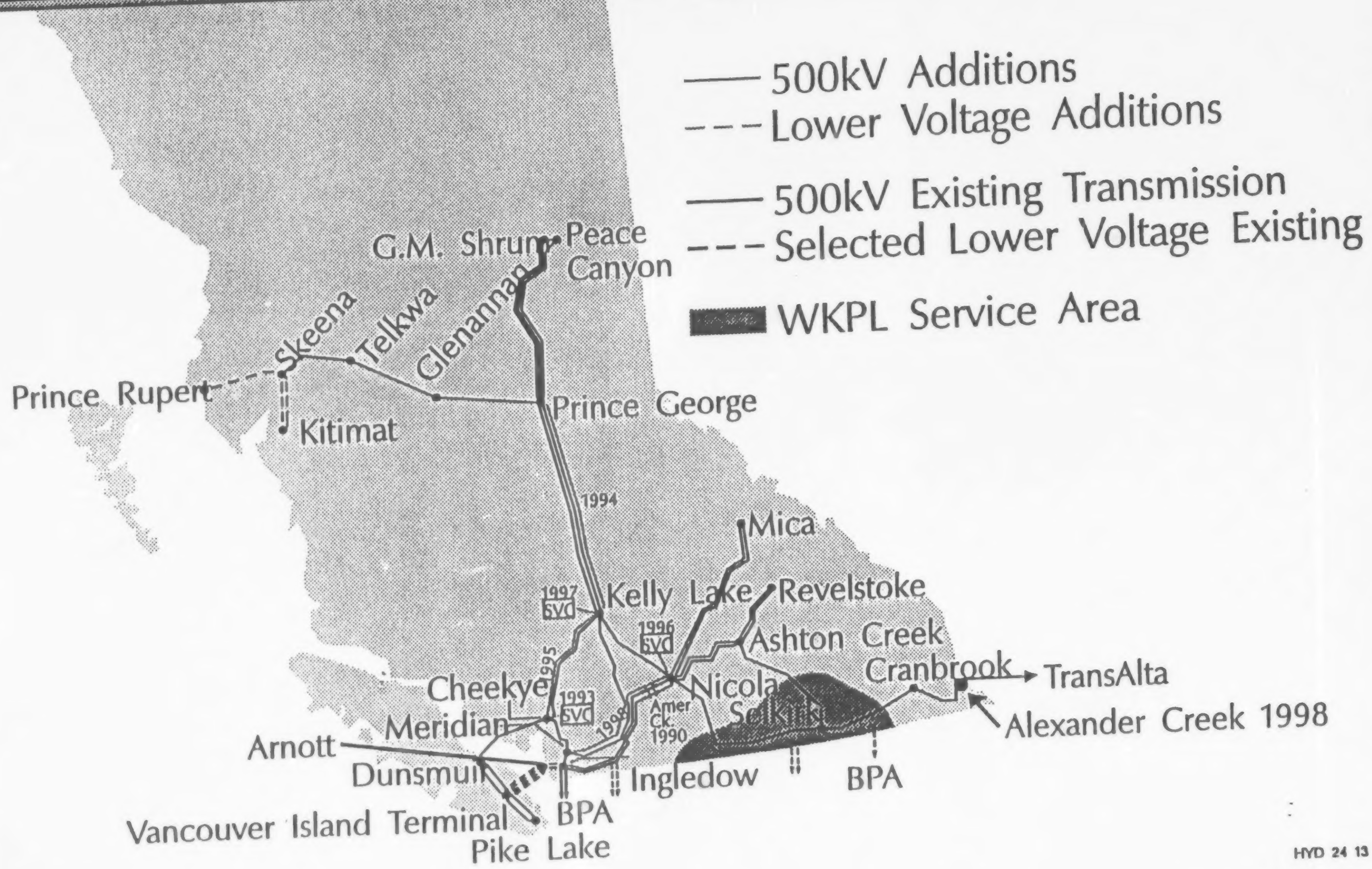


Exhibit 5-13

# Ten Year Plan 1989 – 1999



—— 500kV Additions
- - - Lower Voltage Additions
—— 500kV Existing Transmission
- - - Selected Lower Voltage Existing
▨ WKPL Service Area
G.M. Shrum
Peace Canyon
Skeena
Telkwa
Glenannan
Prince Rupert
Kitimat
Prince George
1994
Mica
Kelly Lake
Revelstoke
1997 SVC
1996 SVC
Ashton Creek
Cranbrook
TransAlta
1995
Cheekye
1993 SVC
Nicola
Selkirk
Alexander Creek 1998
Amer Ck. 1990
1998
Meridian
Arnott
Dunsmuir
Ingledow
BPA
BPA
Vancouver Island Terminal
Pike Lake

HYD 24 13

Exhibit 5-14

# Hydroelectric Energy Scenario

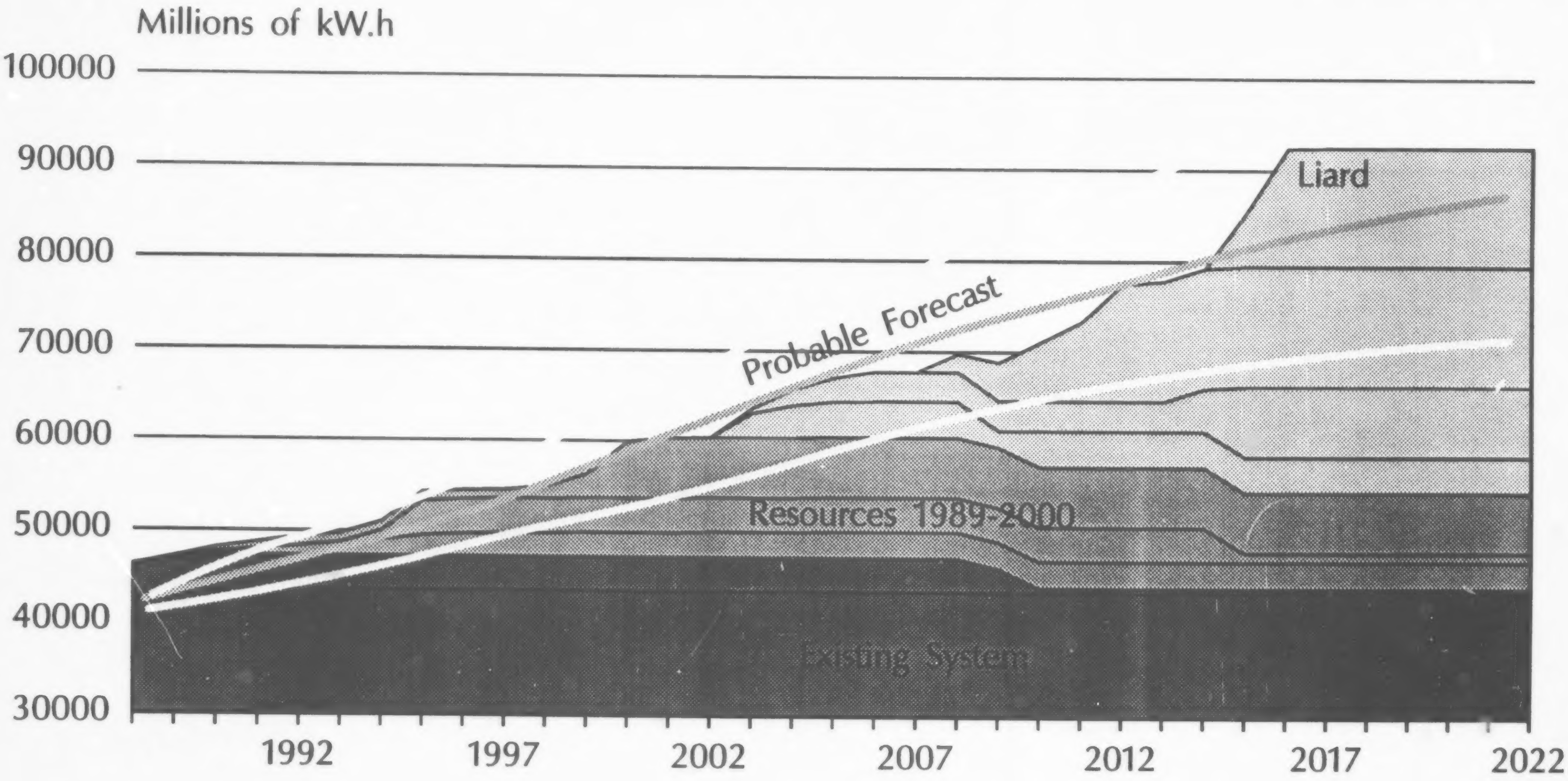


Exhibit 5-15

HYD 33 03

# Thermal Energy Scenario

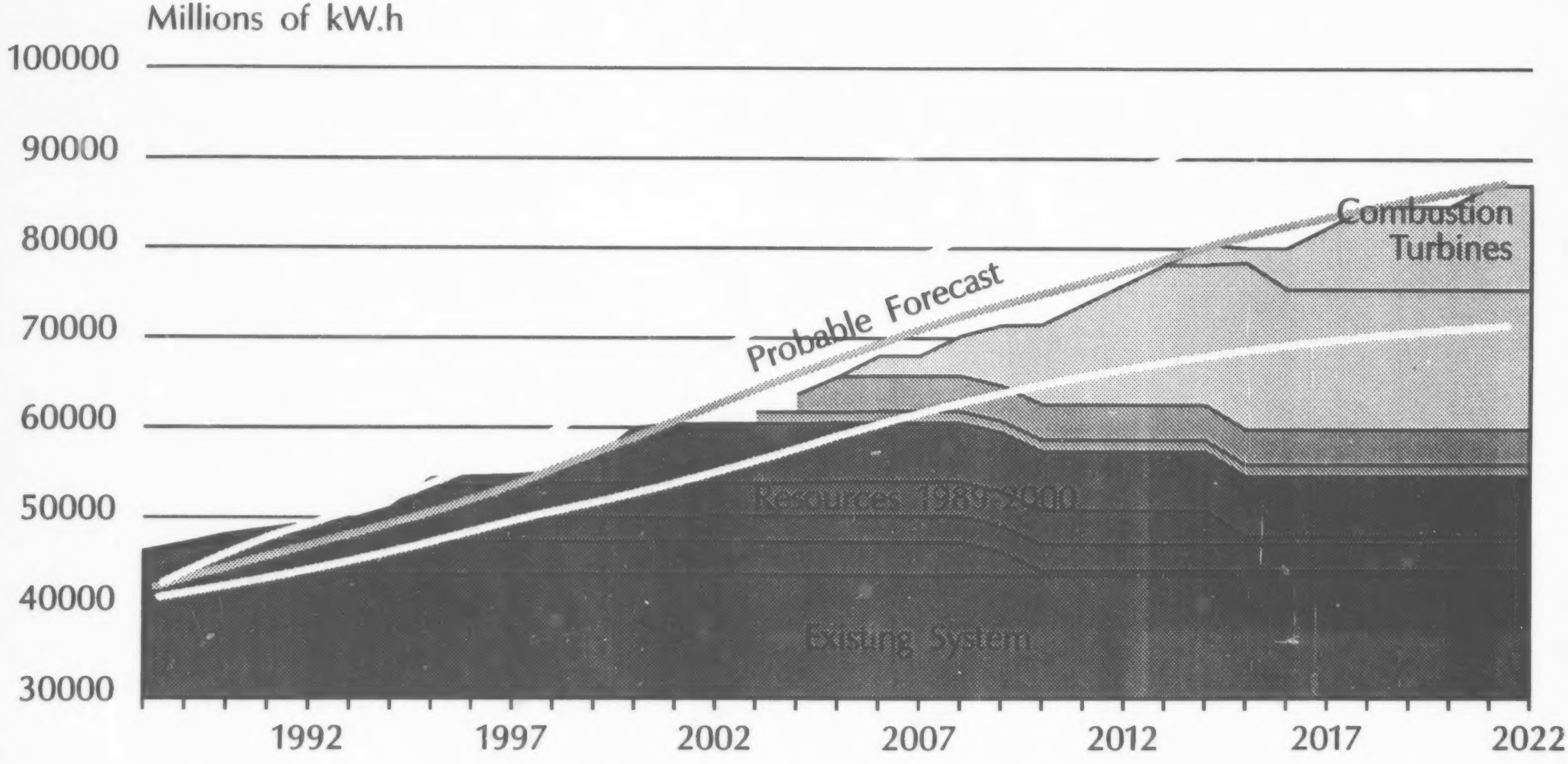


Exhibit 5-16

HYD 33 04

# Alternative Energy Scenerio

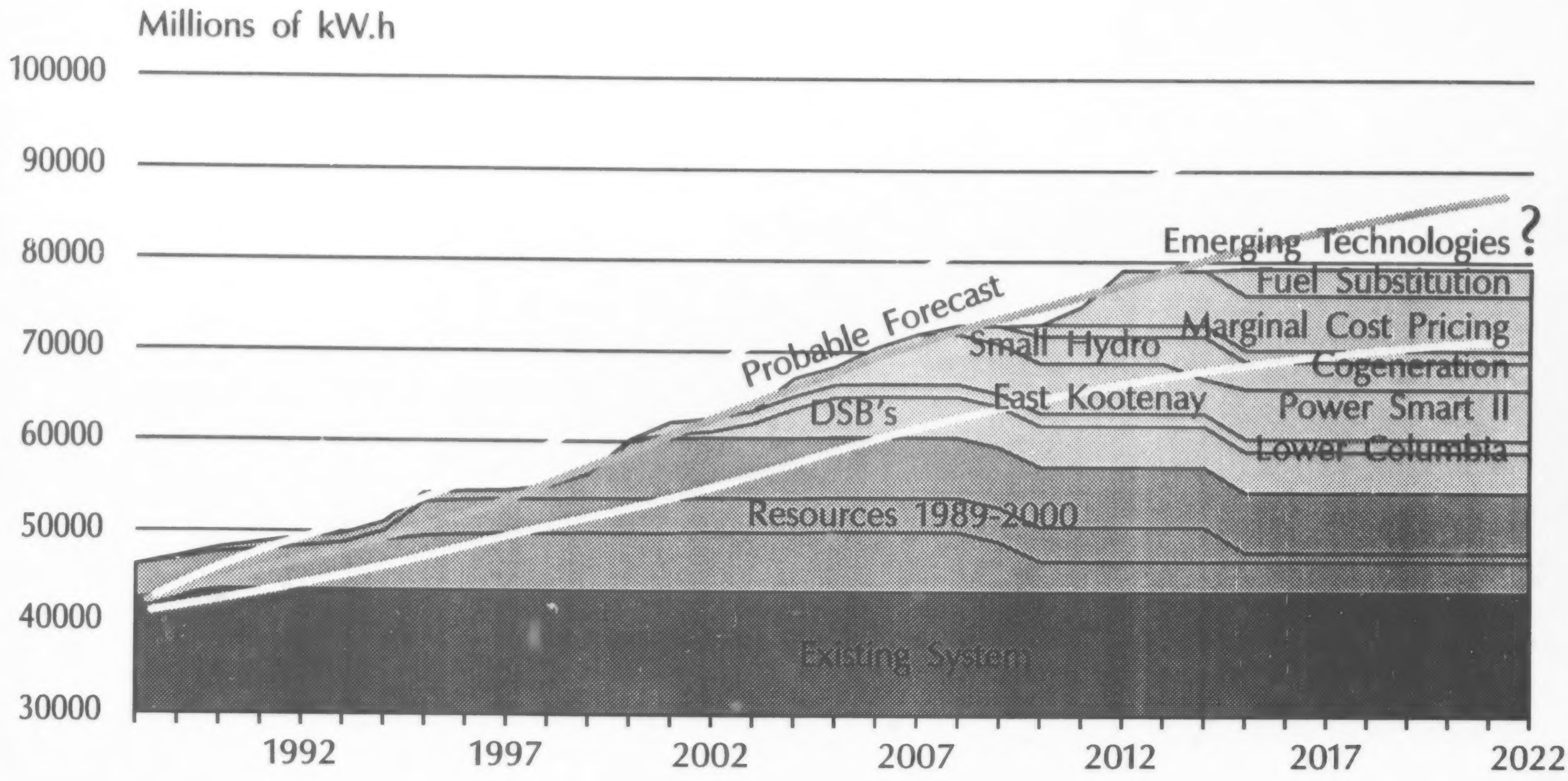


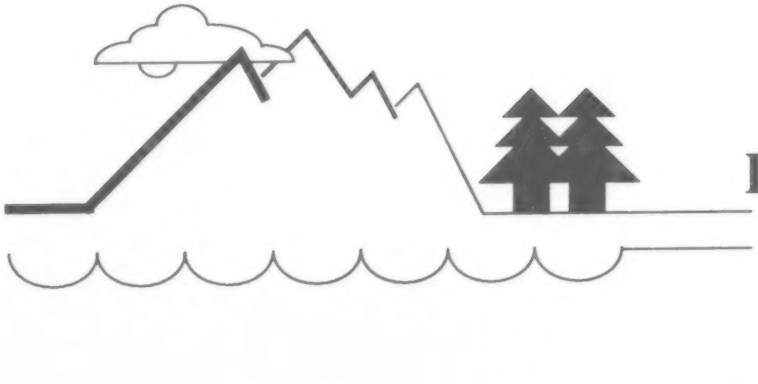
Exhibit 5-17

HYD 33 05

# ELECTRIC ENERGY

## FORUM

## Energy and the Environment



## SESSION III: PUBLIC PARTICIPATION WORKSHOPS

# Thermal Projects and the Environment: How Do They Fit Together?

Dr. Carol D. Burnham

Director - Environment

Ontario Hydro

# Thermal Projects and the Environment
# "How do they fit together?"

## OVERVIEW

Canadians have enjoyed an abundance of relatively inexpensive electricity. Most electricity is generated from provincial primary energy resources. Because there are regional variations, each province uses a mix of energy resources which best meets its needs for electricity production.

In 1987, Canada generated 482 108 GW.h of electricity, 15 percent from nuclear power stations, 65 percent from hydroelectric generating stations and the balance (20 percent) from fossil-fired generating stations. These figures demonstrate the degree to which Canada relies on a variety of energy resources for generating electricity.

The ability to generate electricity in the future will be dictated by the abundance of local energy resources and the ability of technology to address environmental concerns.

While Canada is naturally endowed with an abundant supply of hydroelectric potential, this is located primarily in British Columbia, Manitoba, Quebec and Labrador. There are relatively few accessible and economical hydroelectric resources left to develop elsewhere in Canada. Even the hydraulic-rich provinces may in time require alternate energy sources to meet demand.

Thermal energy from resources such as oil, coal, natural gas and uranium is one option available to meet future demand. The challenge to utilities will be meeting future energy demands in a way which protects our natural environment.

## THE CHALLENGE: "TOWARD SUSTAINABLE DEVELOPMENT"

While environmental concerns have been with us for some time, there has been a marked change in emphasis recently. Increased environmental regulatory requirements which reflect public concern will not only redirect future development but will require some utilities to retrofit existing facilities to reduce emissions to meet the more stringent requirements. Ontario Hydro is one of those utilities.

In 1988 Ontario Hydro's generation total was 139 413 GW.h with 25 percent hydraulic, 25 percent fossil, 48 percent nuclear and the remainder purchased.

Future demand for energy in Ontario is forecast to increase (Exhibit 6-1). In addition to that, provincial and federal regulations require, or will require, reduced emissions to the environment.

The Ontario Hydro Corporate Strategy for the 1990s includes a goal for the "environment" which is:

> "Given that the Province's long-term economic prosperity depends upon the ability to minimize ecological costs, Ontario Hydro will develop and manage its activities and facilities in such a way as to sustain the environmental base."

Sustainable economic development....that is the challenge! Sustainable development is the term used to describe economic development that meet the needs of present without compromising the ability of future generations to meet their own needs. It is particularly concerned with environmental impact of economic development.

The following highlights the emissions of concern from fossil and nuclear thermal generation options and control systems available or being developed to reduce those emissions.

## FOSSIL FUEL GENERATION

Fossil fuel generation in Canada is made up of approximately 90 percent coal, 6 percent oil and 4 percent natural gas.

The fossil combustion process produces a number of by-products which may be emitted to the environment. It involves the handling of fuel, chemicals and waste, which may cause environmental concern. The following emissions to the environment are the most common:

| | |
|---|---|
| Combustion Emissions to Air: | SO2<br>NOx<br>particulates<br>CO2<br>organics<br>trace elements |
| Emissions to Water: | heat<br>leaks/spills<br>runoff(coalpile, ash)<br>water treatment effluents |
| Waste: | fly ash<br>bottom ash<br>oils<br>PCBs |
| Fugitive Emissions: | coalpile<br>ashpile |
| Chemical Usage: | acid<br>base<br>hydrazine<br>chlorofluorocarbons (CFC) |
| Fish Impingement/Entrainment | |

For fossil generation technologies for reducing acid gas emissions (SO2 and NOx), greenhouse gases (CO2, CFC) and waste will be addressed.

A comparison of the relative emissions for each type of fossil fuel based on operation Ontario Hydro facilities is as follows:

| | Emissions (in Mg/GW.h, (gross)) | | | |
|---|---|---|---|---|
| | SO2 | NOx (as NO) | Particulates to air | CO2 |
| Coal-medium sulphur (1.3%S) | 8.9 | 1.7 | 0.31 | 335 |
| Coal-high sulphur (2.4%S) | 15.5 | 2.5 | 0.25 | 310 |
| Lignite (0.4%S) | 4.1 | 1.4 | 0.16 | 338 |
| Oil (0.6%S) | 3.6 | 1.3 | 0.01 | 252 |
| Natural gas | 0.01 | 1.84 | 0.0 | 176 |

## ACID GAS EMISSIONS: SO2 and NOx

Ontario Regulation 281/87 under The environmental Protection Act sets strict limits on Ontario Hydro's acid gas emmissions of SO2 and NOx. These emmission limits are over and above station-specific regulations already in place under the Environmental Protection Act (Regulation 308) for local air quality.

Exhibit 6-2 shows the emission regulation limits together with current and estimated acid gas emissions until the year 2000. Since future coal-fired generation requirements are forecast to equal that required in the mid-1980s, it is evident that acid gas emission control measures are required to be able to meet the regulation.

Options for reducing acid gas emissions from fossil-fired stations can be grouped as:

reducing the sulphur content in fuel;

- coal cleaning
- low sulphur coal
- natural gas
- low sulphur oil

installing emission control equipment;

- sulphur dioxide control technology
- oxides of nitrogen control technology

installing lower emission coal technologies;

- integrated gasification combined cycle
- fluidized bed technology

Table 6-1 details the availability of each of these options and Table 6-2 provides a brief assessment of each for accommodating new regulations at existing Ontario Hydro stations.

The new lower emission coal technology may become viable when looking at building new generating capacity.

## LOW SULPHUR AND WASHED COAL

Reducing the fuel sulphur content by purchasing low-sulphur fuels is an option which will continue to be used especially at stations where retrofit of pollution control devices is impractical because of age, capacity factor or physical constraints. This by itself will not eliminate the need for retrofit pollution control devices in Ontario. Burner modifications may be required to burn lower sulphur coals because of lower volatility. Particulate removal in low sulphur flue gas presents problems for electrostatic precipitators that were designed for higher sulphur fuels. Test burns of low sulphur coal have been carried out both on the Ontario Hydro Research Division Combustion Research Facility and at our 2400 MW Lakeview Thermal Generating Station (TGS). Particulate collection is a key part of the proposed acid gas control program. $SO3$ and $NH3$ injection systems are being installed to improve ash resistivity and reduce plume opacity while burning lower sulphur fuels.

Coals cleaning by physical or chemical methods offers another route to reduce sulphur content. All coal which Ontario Hydro uses is washed before shipping. Research by Ontario Hydro, on advanced coal cleaning processes, has shown that intensive cleaning could reduce the sulphur content of the coal by an additional 20 percent to 25 percent. However, economic analyses indicate that other sulphur dioxide removal processes are as cost-effective as the more intensive physical coal cleaning processes.

Coal beneficiation may, however, be of interest in other provinces.

## COAL BENEFICIATION

Lignite and sub-bituminous coals, because of their high moisture and ash content and pyrophoric nature, have numerous handling and utilization problems including:

- high shipping costs;
- reduced boiler efficiency and total electrical output;
- handling problems due to the large volume required;
- caking in pulverizers.

In addition, low rank coals are extremely hydrophilic and tend to rapidly reabsorb moisture after conventional drying. This reabsorption is an exothermic reaction and can lead to spontaneous combustion of the dried coal. On the other hand, these coals are inexpensive to mine and they contain low amounts of sulphur. Both the Alberta Research Council's coal-oil agglomeration process and Western Energy Company's thermal drying and cleaning process show potential for solving these complex coal problems.

## FLUE-GAS DESULPHURIZATION (FGD)/SCRUBBERS

The flue-gas desulphurization component of Ontario Hydro's acid gas control program will involve FGD equipment on selected existing coal-fired generating stations during the period 1994 to 2010. Based on the most probable load growth forecast of 2.6 percent, compliance will require a reduction in acid gas emissions equal to that achieved by retrofitting eight 500 megawatt units with 90 percent efficient FGD equipment through the period 1994 to 2000. Burning lower sulphur coal would not reduce SO2 emmissions enough to meet the 1994 acid gas limits.

Hydro has conducted a preliminary screening of candidate FGD processes. Selection criteria included: maturity of developed process; the experience of other utilities with the processes; technical risk; reliability; the introduction of secondary environmental impacts, and finally, life cycle costs.

Those FGD processes which met these criteria and were selected for further detailed study included:

* Wet limestone scrubbing
* Lime Spray Dry Scrubbing
* Limestone Dual Alkali Scrubbing; and
* Sorbent Furnace Injection Scrubbing.

Each process has its own set of advantages and disadvantages that will influence application at specific sites. Detailed evaluation studies are in progress to identify the best processes for each site and to obtain Environmental Assessment (EA) approval for a program of installing any of the four candidate technologies on any of three sites. An EA document has already been submitted to the Minister of the Environment for approval.

## WET LIMESTONE SLURRY (WLS)

The Wet Limestone Slurry Process is the most widely applied flue gas scrubbing process. The lime slurry process is a very similar process. Together, these two processes represent approximately 80 percent (or about 42 000 MW) of scrubbing units currently installed by electrical utilities in the U.S. The limestone slurry process is often considered the standard of comparison for new technologies, and is capable of achieving up to 96 percent removal of the sulphur dioxide in the flue gas.

The WLS process uses limestone as the scrubbing reagent to remove sulphur dioxide (SO2) from flue gas. Limestone is delivered to the generating station site and stockpiled. It is taken from the stockpile to a ball mill where it is ground and mixed with water to form a slurry. This slurry is stored in tanks and pumped to the scrubber units as required.

Sulphur dioxide removal takes place downstream of the boiler after particulate collection. As the flue gas enters the scrubber vessel it contacts a limestone slurry being sprayed into the passing gas flow. The limestone slurry reacts with the $SO_2$ in the flue gas to form a waste by-product consisting mainly of calcium salts, with some fly ash and unreacted limestone reagent.

New stacks are required to accommodate the wet post-scrubber gases. Waste by-products leave the scrubber in a fluid stream and can either be pumped to a settling pond or processed for landfill disposal.

Wastes from the WLS process can be used for various constructive purposes. The gypsum can be used to make commercial quality wallboard, now produced in Germany, Japan and in the U.S.

ADVANTAGES:

* uses a comparatively inexpensive and abundant scrubbing reagent -- limestone;
* extensive operating experience in utility industry;
* proven reliability and availability; and
* byproducts can be used to make wallboard-quality gypsum

DISADVANTAGES:

* high capital costs;
* high operating costs due to large quantities of reagent required and a need for frequent maintenance;
* occasional process water discharges may be required to maintain optimal process operation; and
* produces a wet, highly visible plume leaving the chimney that could contribute to some local increases in fog and ground-level icing.
* large waste piles

## LIMESTONE DUAL ALKALI PROCESS (LSDA)

The LSDA process is a wet slurry, regenerative process. The process uses a clear sodium sulphate/bisulphite solution to react with $SO_2$ in the scrubber. After particulate collection, flue gas passes into the scrubber towers where the sulphur dioxide is removed by a sodium scrubbing solution. New stacks are required to accommodate the wet post-scrubber gases.

Limestone is pulverized in a ball mill and then mixed with water to make slurry, which is pumped to a reaction tank in the scrubber building. The spent scrubbing solution is then drained to a tank where it reacts with a limestone slurry to regenerate the sodium sulphite solution. In the regeneration process, a mixture of calcium sulphite/sulphate solids form. These insoluble calcium salts are removed from the scrubbing solution by settling in a thickener. This is followed by vacuum filtering where a filter cake is formed and washed with fresh water. Filter cake washing is used to reduce sodium losses. The wash water from the filter and clarified liquid from the thickener are stored in an overflow tank for reuse in the scrubber.

After dewatering, waste from the filter is carried by conveyor to a mixer where it is combined with fly ash and lime and then moved to a temporary storage pile. The processed waste is eventually transported to a landfill site. An important point to note is that this process can also produce commercial quality wallboard gypsum by putting an oxidizing refinery on the backend.

Currently, there are no utility installations in the US using a LSDA process, although there has been extensive testing in the laboratory and at the pilot scale. There are 6 units in U.S. with lime regeneration.

Processed waste can be used for road base and backfilling applications. The limestone dual alkali system also permits production of a usable gypsum product, but it is more costly than landfilling.

### Advantages

- lower maintenance expense, because the reduced potential for scaling and plugging inside the absorber reduces maintenance costs and increases availability;
- maintenance of a high SO2 removal efficiency (greater than 90 percent) over a wide range of coal types with varying sulphur contents;
- designed to operate with no liquid waste being discharged on a regular or continuous basis to the environment;
- lower operating costs due to reduced maintenance requirements and lower power consumption; and
- improved ability to adjust system operation to respond to changes in station output.
- capable of producing commercial quality wallboard gypsum.

### Disadvantages

- the need to purchase and store an extra scrubbing reagent (soda ash) increases costs; and
- waste material contains soluble sodium salts which may require lining of a landfill area for certain soil types.

## Lime Spray Dryer Process (LSD)

The LSD process is a dry scrubbing system. Lime reagent is delivered to the site and stored in silos. Lime from the silos is mixed with water to form a slurry and is pumped to a series of tanks, where the slurry flows by gravity to the atomizer or sprayer.

All the flue gas from the boiler enters the spray dryer scrubber through a common distribution point and passes directly into the spray dryer modules. The spray drying scrubber equipment is designed to spray the lime slurry into the gas flow. The water content of the slurry feeding the sprayer is controlled so that all of the water evaporates. Mixed calcium salts and fly ash entrained in the flue gas leave the spray dryer as dry particulate matter which is collected in an electrostatic precipitator (ESP) or baghouse. The cleaned flue gas is vented to the existing stack.

The particulate from the ESP, or baghouse drops into hoppers and conveyors move it to waste storage silos. Water is added to the waste from the storage silo, to minimize dust problems and optimize compaction, before it is transported to the landfill for disposal. Some waste is mixed with makeup water and recycled to the spray dryers.

Utilization options for lime spray dryer wastes are similar to those currently being used for fly ash. Most LSD applications to date dispose of the waste as backfill or landfill.

Advantages

- reduced maintenance costs;
- reduced potential for equipment erosion, corrosion and scaling problems;
- elimination of waste water management problems;
- elimination of the need for new chimneys; and
- simplified waste handling and disposal.

Disadvantages

- lower S02 removal efficiency;
- less commercial operating experience, particularly on high sulphur coals;
- requires a higher cost scrubbing reagent (lime); and
- higher capital costs.

## Sorbent Furnace Injection (SFI)

SFI is a dry process that absorbs S02 in the boiler instead of in specially designed scrubber equipment. Tests carried out a Lakeview have achieved about 40 percent S02 removal with limestone injection and 50 percent with hydrated lime injection.

Finely ground limestone (or hydrated lime) is injected into the boiler through nozzles which distribute it into the combustion gases. Sulphur dioxide combines with the injected material to form calcium sulphate and sulphite which are carried in the flue gas and collected downstream to the boiler. Cleaned flue gas will be exhausted through the existing chimneys.

SFI process waste is a fine dry power consisting of fly ash, calcium sulphate and sulphite salts and unreacted limestone or lime. It will be collected in an electrostatic precipitator, conveyed to a storage silo and then to landfill. Before the waste can be landfilled, it must be wetted to control dusting and promote compaction of the waste. When water is mixed with this waste, the high lime content causes a reaction in which substantial heat is released in the form of steam. Handling of this waste will likely involve transporting the dry waste by enclosed vehicles to a landfill where it would be mixed with water and spread in layers to allow release of the heat contained in the waste.

Sorbent furnace injection waste is particularly suited to mine backfill because it causes a drying reaction that stabilizes and neutralizes the mine tailings.

Advantages

- it can be installed and operating in about half the time to build conventional high efficiency scrubbers; and
- it has lower capital costs because scrubbing takes place in the boiler and not in specially designed scrubber equipment.

Disadvantages

- lack of utility commercial operating experience;
- achieves only about 50 percent SO2 removal efficiency;
- higher relative operating costs (reagent and waste handling costs); and
- wastes may require specialized handling because of the high lime content.

Any of these flue gas desulphurization (FGD) options constitutes a major change to our existing generating stations, and thus would require Ontario Government approval under the Environmental Assessment Act (EA Act). Hydro is now approaching the end of a three-year program to secure EA Act approval for FGD. In order to satisfy requirements under the Act, Ontario Hydro prepared and submitted to the Ontario Ministry of the Environment (MOE) and Environmental Assessment (EA).

### Emission Control Equipment - NOx Control

Options to limit the nitrogen oxides (NOx) emissions from utility boilers have been implemented in the past two decades. To date, the majority of implemented approaches have involved combustion controls, whereby furnace, burner and flame geometries are designed to limit the formation and enhance destruction of NOx in the high temperature flame zones. A variety of in-furnace techniques are available for boilers. It includes low NOx burners, and water/steam injection.

The use of post-combustion NOx control strategies generally offer the advantage of a higher potential of NOx reduction than currently available combustion controls. Post-combustion controls, such as selective non-catalytic reduction (SNR), and selective catalytic reduction (SCR), are implemented downstream of the furnace, and generally involve methods to treat the flue gases by chemical means.

## Low NOx Burners

These systems are commercially available for retrofitting both front-wall and tangentially-fired boilers. With front-wall burners, the coal-carrying air is controlled to provide reducing conditions in the early part of the flame. The balance of the combustion air is injected as secondary and tertiary air to burn out smoke and char after NO formation has been suppressed. In tangential systems the secondary air entry is offset to form an air-rich envelope around an inner fuel-rich core. Tertiary air is injected into the upper furnace to complete fuel combustion.

Low NOx burners have been installed on all units at Ontario Hydro's 4000 MW Nanticoke thermal generating station (TGS).

Although low NOx conversions are site-specific, a number of installations have experienced problems with excessive flame length, poor ignition and high carbon carry-over, particularly with bituminous coals. Nanticoke TGS has experienced plume opacity problems since burner modification and has had to reduce generation regularly to meet opacity requirements.

Commercially available low NOx burners are able to meet the requirements of current legislation for NOx reduction. However, further NOx reductions may be required to meet future legislation.

## Selective Non-catalytic Reduction (SNR)

Post-combustion control of NOx by thermal non-catalytic reduction is being applied commercially to both utility and industrial boilers, and may also be applied to gas turbines. Studies by process developers indicate that more than 80 percent NOx could be removed by SNR, making it more competitive with SCR.

The SNR process injects ammonia, urea or other nitrogen-containing compounds into the flue gas in a temperature regime of 1600 to 2000° F, reducing NOx to water and nitrogen. The potential injection location is the upper portion of the furnace. Enhancer chemicals are sometimes used in expanding this temperature range.

Among the nitrogen-containing compounds, urea is receiving more attention because of its properties, and is less costly to inject as a liquid than ammonia is as a gas. Also, because the concentration and droplet size of urea/water injection can be easily matched to furnace temperature, thus providing better load-following capability than ammonia injection. This flexibility reduces hardware requirement. Wall injectors are adequate to provide proper mixing of urea and the flue gas, whereas ammonia injection often requires several injection grids to cover the load range, as well as a vaporizer to convert liquid ammonia to a gas.

In general, SNR process requires little retrofit equipment and no catalyst resulting in a capital cost much lower than SCR.

## Selective Catalytic Reduction

Post-combustion control by the Selective Catalytic Reduction of NOx can reduce emissions as much as 85 percent. It is similar to SNR except that a catalyst is used to make the reactions proceed within a lower temperature regime. Among the most popular catalysts used today are vanadium, platinum, or titanium compounds impregnated on a parallel-plate metallic or ceramic substrate, or integral with a honeycomb-shaped substrate.

SCR has been commercially demonstrated in Japan and Western Europe. In the United States, there is only limited experience with SCR and only pilot plant experience on coal.

NOx is reduced by injecting anhydrous ammonia NH3 into the flue gas after the boiler economizer. The NH3 reacts with the NOx, in the presence of catalyst, at reaction temperatures ranging between 600°F and 750°F for low and medium sulphur coal applications. High sulphur coals emitting more than 2000 ppm SO2 requires a reaction temperature ranging from 650°F to 750°F to prevent catalyst poisoning. An economizer flue gas bypass ducts hot economizer inlet flue gas directly to the economizer exit. This option is used to maintain the process reaction temperatures during low loads, especially for high sulphur coal applications.

Ammonia reacts with NOx, forming water and nitrogen as the products. One side effect is the partial oxidation of SO2 to SO3, a corrosive gas which can accelerate fouling and damage to downstream equipment. In addition, small amounts of unreacted ammonia (NH3 slip) can exit the catalyst bed. This slip tends to increase over time. This is because as the catalyst loses activity, the NH3 injection rate must be increased to compensate, and slip subsequently increase as well. In Japan and Germany, the ammonia slip is limited to 5 ppmv. Therefore, the catalyst must be replaced periodically.

The SCR unit is generally located ahead of the air heater to take advantage of the temperature regime. However, this arrangement may lead to fouling and plugging of the air heater, and higher flue gas acid dewpoints requiring higher air heater exit temperatures, poisoning and erosion of the catalyst, contamination of flyash and scrubber solids with NH3, and changes to flyash resistivity that could impair collection in a downstream electrostatic percipitator. To avoid contamination of other effluent streams and fouling of downstream equipment, the SCR unit could also be placed before the stack. This arrangement would require flue gas reheat to meet reaction temperatures, resulting in energy cost penalities.

## LOWER EMISSION COAL TECHNOLOGIES

### Integrated Gasification Combined Cycle (IGCC)

The IGCC power cycle uses coal gasification, followed by gas cleanup, to produce a fuel for a gas turbine. The hot exhaust gas from this is used to generate steam, which together with steam generated in the gasification process, is used to drive a steam turbine.

Advantages of the process are:

- high thermal efficiences. Up to 43 percent as compared to the 36 percent (and lower) achieved with the best new conventional coal steam plant designs;
- low emissions of sulphur and nitrogen oxides and particulates;
- reduced water demand results in smaller volumes of liquid effluents;
- much reduced design and construction times. Maximum use of shop fabrication can eliminate time-consuming field erection and reduces plant financing costs during construction;
- phased installation of simple cycle, combined cycle and gasification blocks. This allows for the quick installation of natural gas-fired simple or combined cycle generation followed by a switch to coal gasification as dictated by the relative fuel prices;
- modular construction makes cost per kW for smaller plants competitive with larger scale plants allowing capacity additions to closely match load growth. Modularity, short lead times and phased installation provides a flexibility that will reduce the possibility of building over capacity onto an electrical system;
- capital costs promise to be competitive with conventional pulverized coal with flue gas desulphurization;
- co-production or off-peak production of carbon dioxide, methanol, hydrogen or other coal gas derivatives or fuel gas production offer diversification possibilities; and
- because of high cycle efficiency the CO2 emissions per unit of power output can be reduced.

Disadvantages

- gasification plant processes are unfamiliar to most utility plant operators;
- complex technology; and
- limited experience in design, construction and operation.

## Fluidized Bed Combustion (FBC)

A fluidized bed of non-combustible particles such as sand, ash, limestone or dolomite mixed with a fuel such as coal is created and kept levitated in a hot, turbulent state by the up-flow of combustion air entering the bottom of the furnace. When coal is used as a fuel, carbon content in the bed is generally less than 1 percent. Heat may be extracted from the boiler through steam tubes immersed directly in the fluidized bed and by convection tube banks in the exhaust gas path.

The direct contact of the fluidized bed and the boiler steam tubes results in high rates of heat transfer resulting in reduced overall boiler size and combustion temperatures. These lower combustion temperatures inhibit the formation of nitrogen oxides and by using calcium-bearing stone in the bed it is also possible to trap the majority of the sulphur oxides produced as solid sulphur salts in the ash.

The atmospheric FBC designs, circulating, bubbling or various "hybrids" are probably the only types that will be able to meet the technological maturity criterion before 2000. To do so, they must undergo extensive commercial demonstration with a variety of fuels.

The pressurized FBC designs are not likely to see widespread application before 2000 and considerable pilot scale work along with commercial demonstration is yet to be done.

FBC boiler research in Canada continues at the two 18 000 kg/hr boilers at the Canadian Forces Base at Summerside, P.E.I. and at the 20 MW CFB unit at the Canadian Forces Base at Chatham, New Brunswick.

Atmosphere AFC boilers operate with combustion temperature in the order of 900°C. The following major advantages are realized:

- reduced production of NOx
- freedom from slagging and fouling
- ability to use limestone to capture up to 90 percent of the SO2 in the combustion chamber.

Furthermore, they are able to burn a very broad range of fuels.

The major disadvantages of the technology from a utility perspective are its poor limestone utilization relative to conventional flue gas desulphurization and the low limits on unit size, of 200 - 250 MW.

The following[7] is a summary of the assessment of acid gas reductions for various control technologies.

NOx and SO2 Percentage Reductions for Utility Boilers Using Current and Emerging Control Technologies

| Technologies | NOx Reduction Capability | SO2 Reduction Capability |
|---|---|---|
| Current Technologies | | |
| Flue Gas Recirculation | 5-15 | - |
| Lower Excess Air | 5-15 | - |
| Sorbent Injection | - | 40-60 |
| Low-NOx Burner | 25-50 | - |
| Low-NOx Burner, Overfire Air | 25-60 | - |
| Low-NOx Burner, Sorbent Injection | 25-60 | 30-50 |
| Catalytic Reduction, NH3 | 60-90 | - |
| Flue gas desulphurization | - | 70-95 |
| Fluidized Bed Combustion | 70-90 | 80-95 |
| Emerging Technologies | | |
| Fuel Reburning, Staged Combustion | 60-80 | 40-70 |
| Fuel Reburning, Sorbent Injection | 60-80 | 60-85 |
| Slagging Combustion | 70-80 | 70-90 |
| Integrated Coal Gasification with Combined Cycle Operation | 95 | 99 |

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[7] Modified from Environment Canada fact sheet on "Oxides of Nitrogen"

## GREENHOUSE GASES

Concerns have increased over an apparent global warming attributed to rising concentrations of so-called greenhouse gases in the atmosphere. The burning of fossil fuels produces carbon dioxide in large amounts of trace quantities and nitrous oxide.

Carbon dioxide is estimated to be responsible for 50 percent of the predicted warming, chlorofluorocarbons (CFCs) 25 percent, with methane, ozone and nitrous oxide making up the balance.

### Carbon Dioxide

Approximately 75 percent of the anthropogenic contributions of carbon dioxide to the atmosphere are the result of fossil fuel consumption, and the remainder due to deforestation and changes in land use practices. In 1985, coal and gas burning account for 24 percent of the fossil-related CO2 emissions by Canada, while refined petroleum products accounted for the remainder. Utilities are believed to produce approximately 15 percent of the world's anthropogenic releases. Ontario Hydro's CO2 emissions, in terms of Ontario's total CO2 emissions, are presented in Exhibit 6-3.

Carbon represents between 60 and 70 percent of the weight of coal being burned. Methods for removing CO2 typically consist of absorption in a liquid or solid absorbent (such as sodium carbonate or silica). The CO2 is then stripped using heat, steam or an inert gas, and then disposal must be sought. Solutions for disposal that have been considered were piping to the ocean depths, spent oil and gas wells, and salt caverns. Studies in the U.S. indicate that controls on fossil fuel power plants would lead to a 10 percent reduction in the incremental atmospheric CO2 content, and production costs of electricity would increase by 56 percent to 100 percent. It is estimate that a 25 percent increase in energy production would be required to scrub and dispose of the carbon dioxide.

Because extraction processes are so costly and energy-intensive, planners are looking more towards demand management, fuel substitution, improved energy efficiency and alternate energy options rather than adding CO2 control equipment to existing fossil-fired stations. Relative CO2 production from various fossil fuels is presented in Exhibit 6-4.

There may also be a shift towards a hydrogen economy which, of course, will require electricity for its production. Hydrogen is an attractive alternative to fossil fuels because it burns cleanly, producing no CO2.

### Nitrous Oxides (N2O)

A recent study by Environment Canada in conjunction with the Canadian Electrical Association demonstrated that N2O emissions were negligible for conventional fossil technologies.

### Chlorofluorocarbons (CFCs)

Fossil generating stations are not major users or emitters of CFCs.

### WASTE

Ash production from coal/lignite-fired generating stations is a major concern. Not only is the handling a major undertaking but the ultimate disposal can pose problems - fugitive dust, trucking and land fill requirements. It is estimated that Ontario Hydro fossil stations produced about one million tonnes of ash in 1988, 80 percent of which was flyash and 20 percent bottom ash. This works out to 30 Mg of ash per GW.h. Efforts are being made to utilize the ash. Fine powder-like flyash can be utilized as a cement component and in road construction.

The coarser cinder-like bottom ash can be used in road construction. Varying levels of success in ash utilization for Ontario stations have been reached, depending on location and ash quality. 1988 results were:

| Station | Ash produced (Tonnes per annum) | Ash Utilization |
|---|---|---|
| Lakeview TGS | 135,000 | 100% |
| Lambton TGS | 250,000 | 30% |
| Nanticoke TGS | 520,000 | 0% |
| Thunder Bay TGS | 130,000 | 20% |
| Atikokan TGS | 90,000 | 0% |

Continued emphasis on marketing and utilizing ash wastes is required to further reduce disposal costs and minimize environment impact.

The implementation of scrubber technology will produce additional wastes in the form of scrubber sludge. In addition, this FGD technology is likely to adversely affect ash quality and hence utilization. Technologies which minimize this FGD waste or permit use of the by-product (gypsum production) should be emphasized.

## FISH LOSS AT COOLING WATER INTAKES

Adult and juvenile fish are impinged on screening equipment at Ontario Hydro's generating facilities on the Great Lakes as a result of the large volumes of water that are used for cooling. The types and quantities of fish impinged at all intakes have been recorded since 1976 and are routinely reported to the Ontario Government.

A study be representatives of Ontario Hydro, Ministry of the Environment and Ministry of Natural Resources was carried out to determine the environmental significance of this impingement of adult and juvenile fish. Initial work focussed on Lake Ontario, where the largest amount of fish impingement was occurring.

The study established a model of the relationships between forage fish, salmonid predators, and fish impingement. The model showed that at the present rate of fish loss at Ontario Hydro cooling water intakes, fish populations are not being significantly affected. Thus, alterations to existing cooling water intakes to reduce the amounts of fish impinged are not required.

Assessment is required of the environmental significance of the loss of the numbers of fish eggs and larval entrained by the generating facilities. Basic research may be required into the life histories of species for which insufficient information is available.

## THERMAL EMISSIONS

Large volumes of cooling water are used at Ontario Hydro's thermal generating stations. In 1974, the Ontario Ministry of the Environment established guidelines for the effluent temperature (32.2°C) and temperature rise (11.1°C) from intake to discharge of Ontario Hydro's heated discharges. They were written at a time when the greatest environmental concern about once-through cooling systems was the temperature of the discharge water. As more data were gathered by Ontario Hydro and others concerning the environmental effect of thermal effluent, concern over potential effects shifted to the quantity of water used in cooling systems.

Considerable data have been accumulated which indicate that the levels at which environmental effects may occur, due to either effluent temperature or temperature rise from intake to discharge, are above those presently prescribed by the thermal effluent guidelines. The extra amounts of cooling water which are required to remain within the guidelines may, in fact, be imposing an unnecessary effect on the environment.

## NUCLEAR GENERATION

All nuclear reactors operate on the same basic principle - heat from nuclear fission. This presentation will be limited to comments on CANDU (Canadian Deuterium Uranium) reactors. The Heavy Water Plant at Bruce and the Douglas Point Nuclear Power Demonstrator are also considered an integral part of nuclear operations.

Nuclear generation in Canada in 1986 amounted to 67 000 GW.h or 15 percent of all electricity generated. Only the provinces of Ontario, Quebec and New Brunswick operate nuclear generation at this time. The fission process produces a number of by-products which may become environmental concerns, and the handling of chemicals, waste and spent fuel.

The following are the most common emissions to the environment:

| | |
|---|---|
| Emissions to air: | tritium<br>noble gases<br>iodine-131<br>particulate |
| Emissions to water: | tritium<br>gross heat<br>heat<br>leaks/spills<br>hydrogen sulphide (heavy water plant) |
| Waste: | radioactive waste<br>spent fuel<br>oils<br>PCBs |
| Chemical Usage: | chlorofluorocarbons<br>acid<br>base<br>hydrazine |
| Fish Impingement/Entrainment | |

## Radioactive Emissions

Radioactive emissions from Ontario Hydro nuclear generating stations are controlled to a small fraction (approximately 1 percent) of the Atomic Energy Control Board (AECB) approved Derived Emission Limit or regulatory limit. For this reason, the radiation dose from nuclear stations to individuals or groups living nearby is small compared with the safe regulatory limit and probably indistinguishable within the normal variation in background dose.

All Ontario Hydro nuclear generating stations and the Radioactive Waste Operations Site met the annual operating target of 1 percent of the Derived Emission Limit for all radionuclide groups based on annual emissions for 1988. This is consistent with past performance.

As well as monitoring radioactive emissions from nuclear facilities, Ontario Hydro monitors human exposure pathways in the environment around these facilities. The environmental monitoring serves to:

- provide assurance that the health of persons living near the station is being protected;
- provide assurance that emission monitoring is adequate;
- demonstrate that the models used in deriving emission limits are appropriate.

A routine environmental monitoring program for each Ontario Hydro nuclear facility is well-established. Provision for rapid implementation of additional data collection in the event of a radioactive leak or spill is built into the program.

An annual assessment of the environmental radiological data is made and reported to the AECB as a licence condition.

## Radioactive Solid Waste - Low-level

Low-level radioactive waste materials are items such as mops, plastic sheeting, and protective clothing. These materials are compacted, stored and monitored in concrete trenches or in above-ground concrete buildings. They represent only a small portion (1 percent) of the total activity in radioactive waste. The remainder is in the used fuel which is referred to as high-level waste.

Volume production of low-level radioactive solid waste within Ontario Hydro has increased over the years in line with the increase in nuclear generating capacity. The current rate of production is abut 7000 $m^3$/year total from the 16 operating nuclear units. Since there is no disposal facility available yet, most of the radioactive waste has been placed in storage facilities directly.

The processing and storage or the radioactive waste, from all Ontario Hydro nuclear facilities, has generally been carried out at the

Radioactive Waste Operation Site at the Bruce Nuclear Power Development. Additional processing and storage facilities are built as required.

Transportation, processing, and storage of the radioactive waste have been carried out in accordance with all the regulatory requirements for protection of the environment, the public, and our operators.

Recent regulatory developments with regard to disposal and with regard to defining a level of radioactivity which requires no further control (de minimis) are expected to have a strong influence on all waste management facilities and practices currently being considered.

Additional storage and processing facilities currently being considered may cost up to 30 M$. The decision on the new facilities has to take into account potential for waste production increases as well as decreases, regulatory developments with regard to disposal, and storage to de minimis, aging of the existing equipment and compatibility with equipment and procedures at all our nuclear facilities.

The potential for significant increases in waste production would result from future expansion of the nuclear program at (Darlington Nuclear Generating Station), major rehabilitation programs (pressure tube replacements), and aging of the nuclear facilities.

## High Level Radioactive Waste (Spent Fuel)

Nuclear fuel bundles in a reactor produce heat efficiently for a period of approximately two years. Through normal operation, an average 600 MW CANDU nuclear reactor produces about 3.3 cubic metres of used fuel bundles per year.

On removal from the reactor, the fuel bundle requires remote handling and special storage. It continues to radiate energy caused by the decay of radioactive material within the bundle. This material will decay to stable nonradioactive elements over time. Most of the high penetrating radiation will be gone in 500 years.

All used fuel is kept on-site at the nuclear generating station and stored in water-filled bays. Water keeps bundles cool and provides an effective radiation shield because it absorbs the energy from the bundle. The used fuel can be stored under water for decades or it can be transferred to dry concrete canisters on site.

An alternative to on-site storage being considered is "permanent disposal". This method would not rely on longterm human supervision. Options include underground disposal of waste in granite, in salt domes and other stable geological formations.

Scientists agree that a practical method of permanent disposal would be to place the used fuel in deep and dry underground vaults.

Atomic Energy of Canada Limited has built an underground research laboratory in eastern Manitoba near Lad du Bonnet, where they are making experiments under conditions to be expected in an actual disposal vault.

Used fuel would be encased in corrosion-resistant containers to be placed in disposal rooms and surrounded by compacted clay at 500 to 1,000 metres below the surface. The rooms would then be backfilled and sealed. After a period of monitoring to confirm the integrity of the containment, the tunnels and shaft of the entire disposal vault could also be backfilled and sealed. The surface area could eventually be returned to normal use. A single disposal vault could hold all the used fuel from 100 years of operation of all current Canadian nuclear generating stations.

Having an approved method for disposal of nuclear waste will be the most important criterion for obtaining commitment to a new nuclear generating facility.

## SUMMARY

Thermal generation from coal, oil, natural gas and uranium will continue to be required to meet future energy demands. Environmental concerns must be addressed as an integral part of the economic planning cycle -- not as an add-on. Technology exists or is under development to address most of these concerns. That is the beginning of "sustainable development".

# References

1. Ontario Hydro "Acid Gas Control Reference Plan (AGCRP 89-01"), January 1989.

2. Ontario Hydro "Options Available to Meet Acid Gas Limits and Selection of Preferred Options", January 31, 1989.

3. Canadian Electrical Association "Priorities for Flue Tas Emission Controls and Clean Coal Technology Research and Development" CEA No. 88/1939-31, July 1988.

4. Environment Canada "Environmental Codes of Practice for Steam Electric Power Generation - Design Phase", December 1986.

5. A. Shalaby and B. L. Gooder, Ontario Hydro "Ontario Hydro's Program to Reduce Acis Gas Emissions" Joint Power Generation Conference (ASME/IEEE), Miami, October 1987.

6. Environment Canada Fact Sheet, "Oxides of Nitrogen".

7. Dr. W. R. Effer, Ontario Hydro "Technical and Planning Responses to Changes in Regulatory Requirements - An Electric Utility Perspective" presented in the technical seminar series "Canada High Technology in the 1990s", India, February 1989.

8. Canadian Nuclear Association "Seeking to Generate a Better Understanding", Fact Sheet, 1988.

Table 6-1

## LIST OF OPTIONS AND THEIR AVAILABILITY

| | ALREADY IN PLACE | MID 1990s | LATE 1990s |
|---|---|---|---|
| **REDUCE SULPHUR CONTENT** | | | |
| Coal Cleaning - Washing | Already used 20% sulphur removal. | Continue to use. | Continue to use. |
| - Chemical | Not yet commercial. | | May be commercial. |
| Lower Sulphur Coals | Already burning medium and low sulphur coals. | Plant modifications at Lambton and Nanticoke to allow lower sulphur coal. | Further plant and fuel handling modifications possible for expanded use. |
| Natural Gas | Capacity at Hearn 1200 MW now mothballed. Fuels most cogenerators. Reserved for contingencies. | Hearn reserved for contingency. Use for ignition, cofiring and in new combined cycle plants being considered. | Price, pipeline capacity uncertain. Fuels cogeneration. New supply options being discussed in Demand/Supply Planning Strategy. |
| Low Sulphur Oil | Capacity at Lennox 2200 MW. Reserved for peaking duty. | Use for peaking duty expected. | Price uncertain. |
| **INSTALL CONTROL TECHNOLOGY** | | | |
| Flue Gas Desulphurization (FGD) | Experimental furnace injection installation at Lakeview. FGD selection program. Seek approvals to retrofit FGD facilities. | Several scrubbers a year can be retrofitted once approval received. | Several scrubbers a year can be retrofitted once approval received to a maximum of 20. |
| $NO_x$ Control | Low-$NO_x$ burners retrofitted at Nanticoke. Research improved options. Further retrofit as required. | Retrofit applications as required. | Retrofit applications as required. |
| **LOWER EMISSION COAL TECHNOLOGY** | | | |
| Integrated Gasification Combined Cycle (IGCC) | Not available. | Not available. | New capacity being discussed in Demand/Supply Planning Strategy. |
| Atmospheric Fluidized Bed Combustion (AFBC) | Not available. | New capacity being discussed in Demand/Supply Planning Strategy. | |

Table 6-2

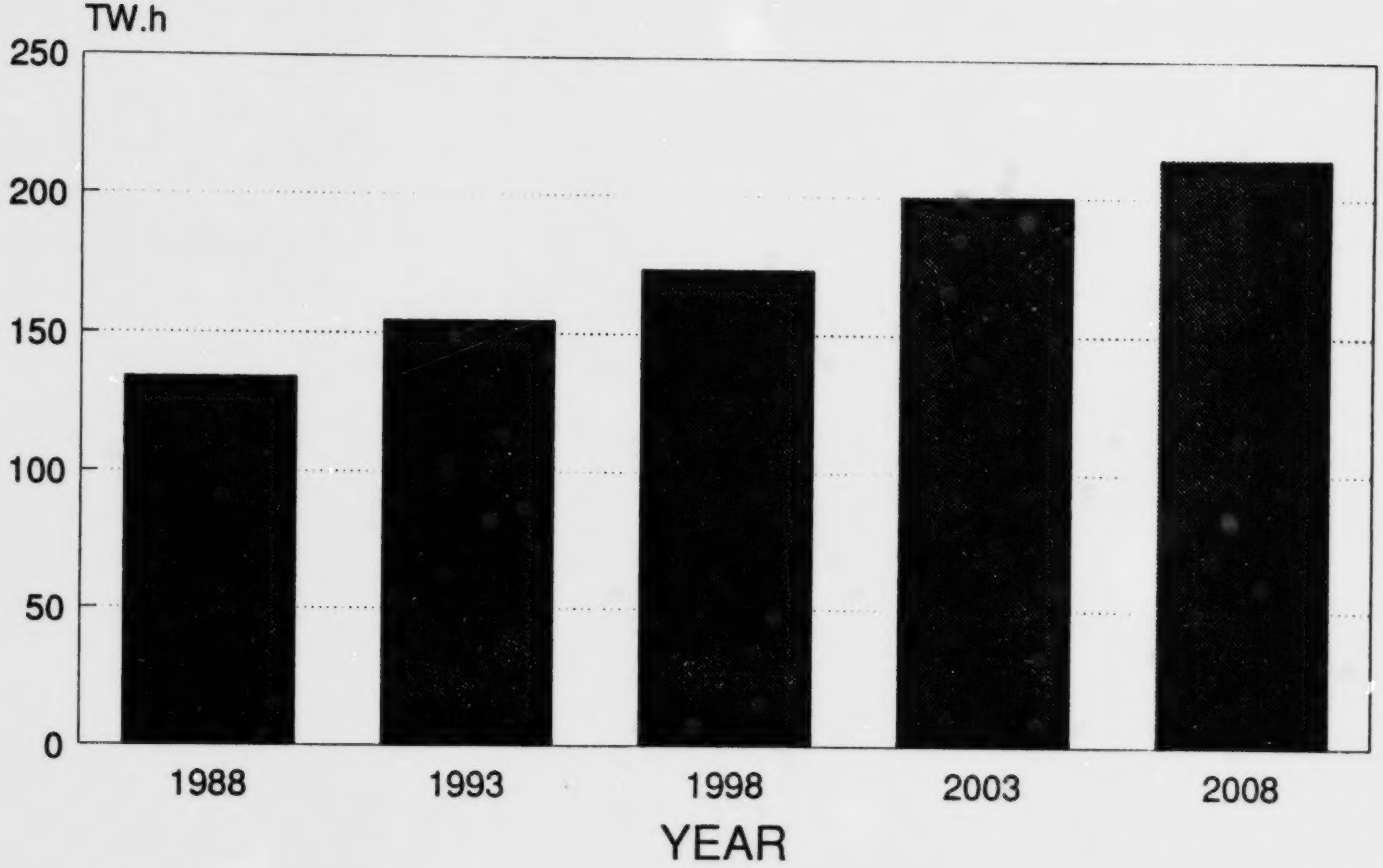
## ASSESSMENT OF EACH CATEGORY

| DESCRIPTION | REDUCE FUEL SULPHUR LEVELS | CONTROL TECHNOLOGY | LOWER EMISSION COAL TECHNOLOGIES |
|---|---|---|---|
| ADVANTAGES | Significant potential to reduce acid gas.<br>Reduces need for expensive coal plant retrofits.<br>Faster implementation. | Up to 95% effective in reducing $SO_2$.<br>Allows more fuel flexibility.<br>Suited to high use generating units.<br>Some proven technology. | Up to 95% effective in reducing $SO_2$ and $NO_x$.<br>Staged implementation possible.<br>Supply electricity as well as reduce emissions. |
| Disadvantages | Potential fuel supply and infrastructure limits.<br>Natural gas and oil price and supply uncertainties.<br>Equipment upgrades and improvements required.<br>US requirements for low sulphur coal uncertain. | Significant capital expenditure.<br>Disposal of by-product.<br>Long lead times for approvals and construction.<br>Selective catalytic reduction of $NO_x$ is expensive. | Unproven at utility scale.<br>Uncertain operating and capital costs.<br>High cost as retrofits. |
| Conclusions | Current plans are to reduce sulphur levels in fuels.<br>Current plans are to modify stations to allow expanded low sulphur coal use.<br>Expanded use of low sulphur fuels dependant on fuel prices and control needs. | Acceptable $SO_2$ option.<br>Commercially available.<br>Plans are to install first FGD units in mid-1990s with further units as required. | Limited availability.<br>Option for future fossil generation.<br>Current costs are uncertain. |

Exhibit 6-1

# FUTURE DEMAND

## ...in Ontario...

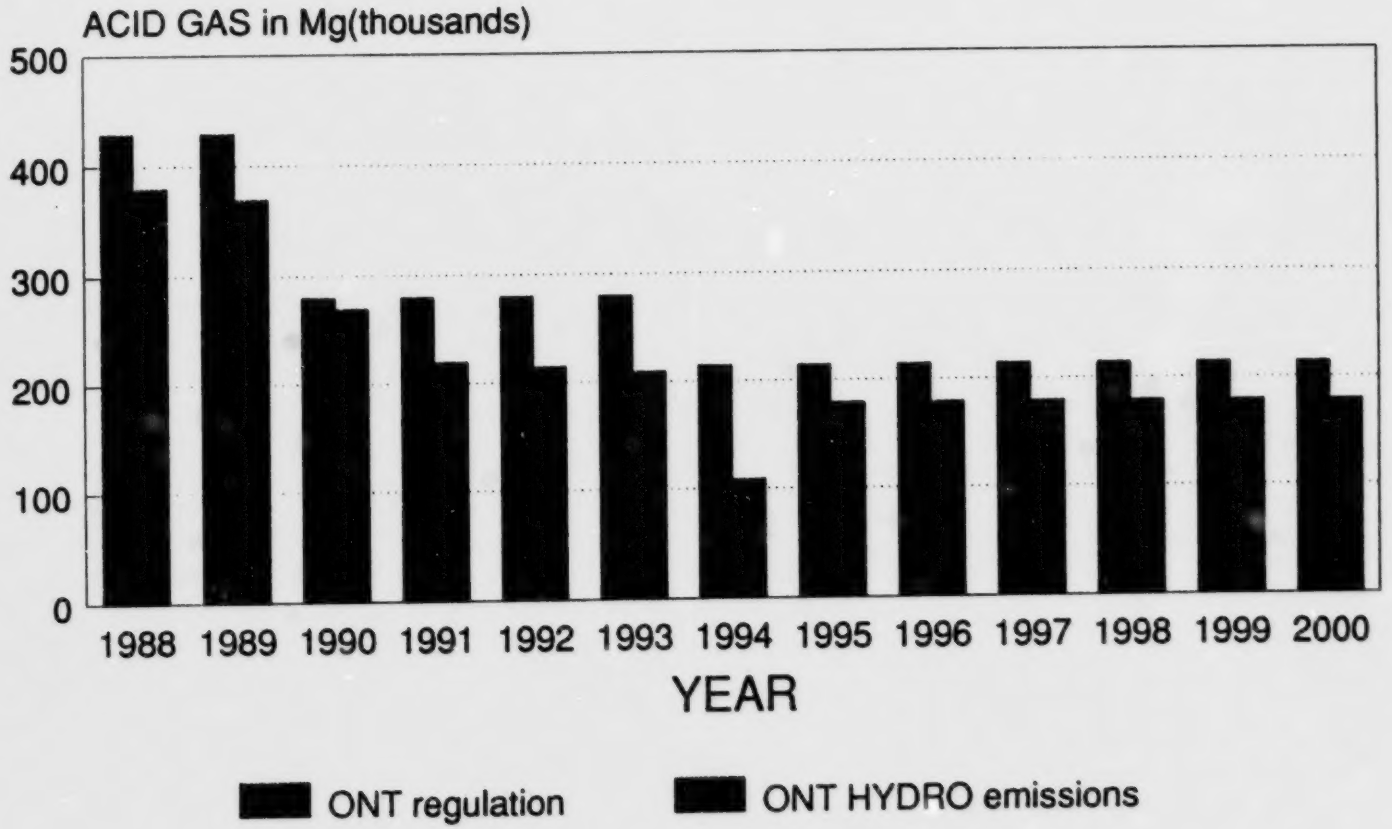


1988 is actual data

Exhibit 6-2

# ACID GAS REGULATION

## ...vs emissions...



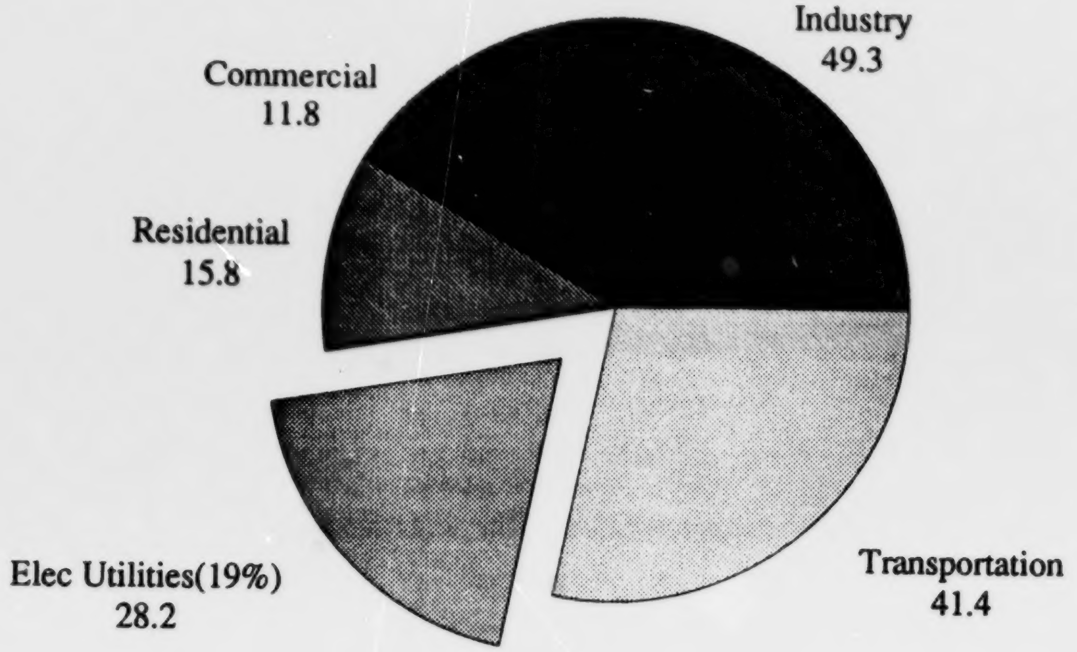
acid gas = SO2+NO

Exhibit 6-2

Exhibit 6-3

# ONTARIO CO2 EMISSIONS

## ...total by sector, Tg...



1987 data

Exhibit 6-3

Exhibit 6-4

# CO2 PRODUCTION

## ...from combustion of different fuels...

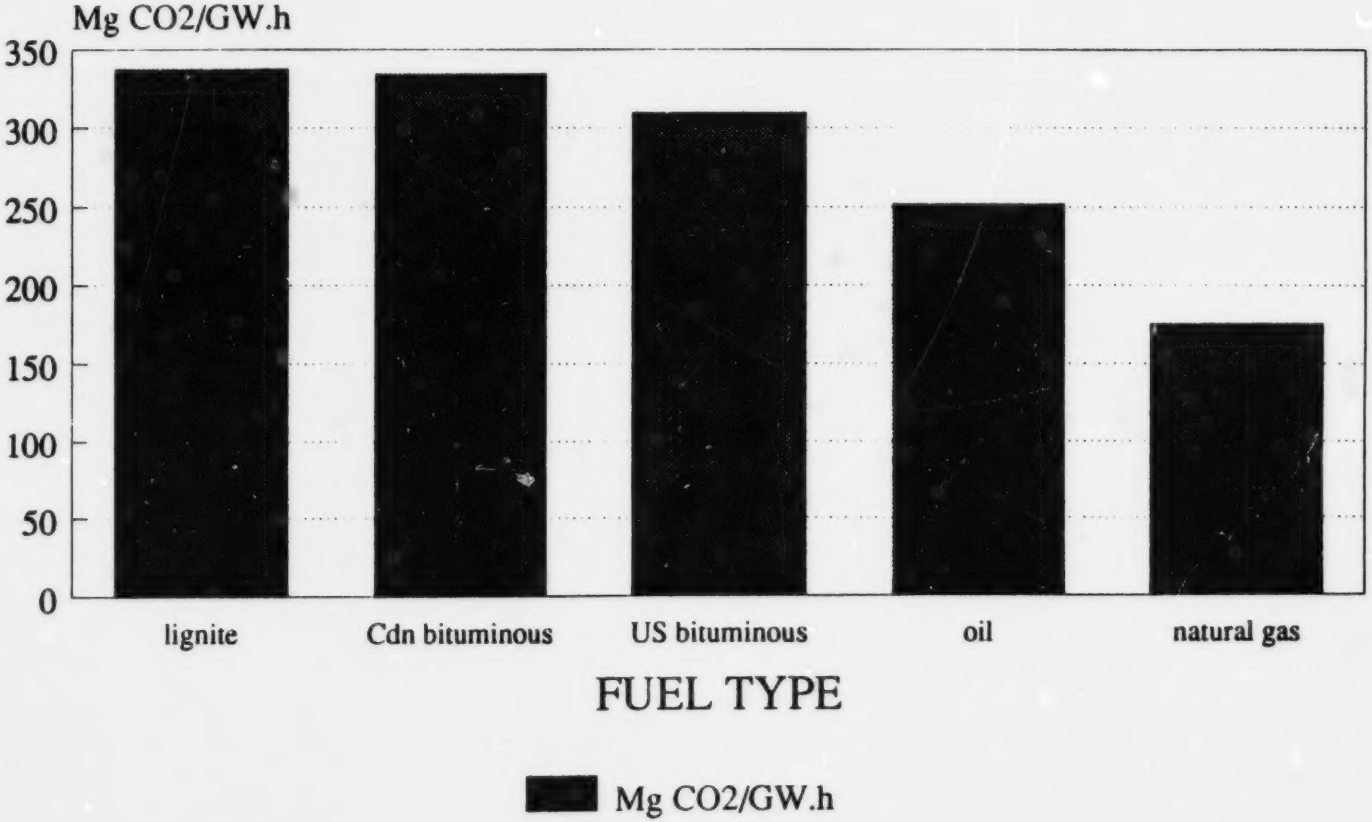


Exhibit 6-4

# ELECTRIC ENERGY

## FORUM

## Energy and the Environment

## SESSION IV: PUBLIC PARTICIPATION WORKSHOPS cont'd

# Summary of Outcome of Workshop Sessions

Nick Sonntag

Senior Partner

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# OVERVIEW

Several major issues emerged from the working group sessions of the Second Annual Electric Energy Forum on Energy and the Environment. This overview summarizes the issues, addresses related factors and considerations, and indicates proposals and recommendations of the working groups.

The overview synthesizes the separate group sessions held as part of the Forum into a cohesive summary. While it combines and consolidates a large amount of material and many hours of work, every effort has been made to reflect as accurately as possible the intent of the participants and the tone of the Forum.

The five major issues that emerged from the Forum are the following:

- There is a need for flexible yet adequate forecasting, environmentally and socially acceptable project planning, and responsible and sustainable development.
- Ongoing public involvement in resource planning, and mechanisms for two-way communication between B. C. Hydro and the public are essential.
- Though hard to quantify and evaluate, environmental protection and non-quantifiable social risks and values are as important as economic factors in both short- and long-range planning.
- Developing alternative resources and encouraging energy conservation are of utmost importance and should have very high priority.
- There is concern about the way B. C. Hydro makes policy decisions and the image it has with the public. There is also confusion about the several roles it plays.

Each of these issues will be treated in turn.

Forecasting, Planning and Development: Forecasting, short- and long-range planning and resource development must include consideration of effective and responsible economic, social and environmental concerns and parameters. A balance is needed between small- and large-scale projects in order to maximize the advantages and minimize the disadvantages of both. Planning should be province-wide; social and environmental factors, not only economic, should receive high priority. Mitigation plans should be included from the outset. Demand- and not supply-side considerations and forecasts should be factored into long range planning and there should be flexibility to adapt as demand changes. There should be a review process, a system of checks and balances, for ongoing monitoring. There is concern regarding the effect of export policies on energy development in B. C. The general public and impacted communities should be involved in and informed about planning and project development early on. Independent agencies and neutral parties should be involved in forecasting and planning. An energy program using a resource mix is favoured.

Considerations: Complicating factors are the lack of complete base-line inventories of resources; the difficulty of accurate forecasting; concern about the validity of assumptions used in forecasting; the fact that there is no clear perception of what sustainable development means, and that no clear policies, industrial or governmental, exist for its implementation; the lack of mechanisms for meaningful public involvement; the fact that existing pricing strategies encourage sales and consumption, and discourage conservation; the perceived or existing lack of political and personal will or motivation to incorporate conservation and environmental considerations into decisions or actions.

Proposals: A variety of recommendations came out of the workshops, including the following: use incentive pricing to shape demand and encourage conservation; employ demand-side forecasting and planning; build flexibility and monitoring into energy projects; inform and involve the public and encourage cooperation toward a common goal. Both government and industry should institute a balanced, consistent approach to environmental risk and cost/benefit analysis and monitoring, including the input of independent groups.

Public Involvement and Communication: This issue was viewed to be of primary importance in all workshops. Whether the issue was forecasting, planning and development, environmental protection and non-quantifiable social risks and values, alternative resources and conservation, or the policies, image and roles of B. C. Hydro, there was a pronounced emphasis on the importance of continued public involvement and communication. This involvement and communication should begin early, in the policy-making and planning stages. The public should be informed about the process of developing energy resources, including the exploration of available options, as well as about predicted environmental effects and possible mitigation and compensation. Communication and involvement should be ongoing, that is, it should continue throughout the development and monitoring of the project. It should encompass short- and long-range policies and decisions. It should be two- or multi-way meaning that the public should be informed, educated or involved by B. C. Hydro, and that B. C. Hydro should receive and incorporate input from the public. The government, industry and regulatory agencies should also be involved in this network of communication, as well as the variety of impacted communities, stakeholders and the general public. The goal is cooperation between these various groups in the development and implementation and sound energy policies and resource planning.

Considerations: Some of the factors which complicate this issue are the lack of mechanisms for effective two- or multi-way communication and a lack of mechanisms for translating information into action. A further factor is a perceived "fortress image" of B. C. Hydro, an image seen by some to be non-receptive to external input.

Proposals: There is, in spite of the difficulties, a clear perception that people do want to be involved, and the sense that B. C. Hydro can and should be pro-active in dealing with the public - informing, listening, interfacing and responding. Examples of public input into planning do exist and should be explored. Numerous suggestions were made in the Forum about possible forms of involvement and communication: direct contact, formal and informal meetings, regional forums, education programs, newsletters, information releases to local libraries or resource centres, public hearings, mass media and feedback through surveys and statistics. The Forum itself is seen to be a definite step in the right direction.

Environmental Protection and Non-quantifiable Social Risks and Values: As with public involvement and communication, these issues were deemed critical in all study groups These factors should be as important as economic considerations in both short- and long-range planning and development. Guidelines are needed for acceptability, for equity, for potential trade-offs, and for evaluating environmental and social costs. Costing practices should be transparent and should reflect total costs including the environmental and social costs, such as costs of development, impact of transmission lines and electromagnetic fields, and habitat destruction, for example. Native people should be consulted where projects impact their land and lives. There is a need for an ongoing and consistent approach to impact assessment. Long-term and post-impact monitoring are seen as important in closing the loop and providing feedback as to the real effect and total cost of projects. The public should be informed of potential risks, and their understanding of the implication of these risks should be increased.

Considerations: There is an acknowledgement that by their very nature, factors like quality of life, aesthetics, health and health risks, social and cultural values, ethics, value of natural resources (land, water, wildlife) are hard to evaluate and quantify. There are only incomplete base-line inventories of resources impacted by energy projects. Further complicating factors are the difficulties in enforcement of existing regulations, availability of government resources for environmental protection and the conflicting interests in setting policy direction.

Proposals: Demand-side management would be a possible way to reduce the need for transmission lines, and the use of corridors would their impact. Although difficult, a start must be made in developing costing policies and pricing strategies which include environmental and social risks and values. The public and impacted groups should be made aware of the health and environmental implications of energy projects. Impact assessment, and long-term and post-impact monitoring should be implemented, and independent parties should be included in the process. Pressure should be brought to bear to obtain the enforcement of existing environmental regulations and economic policies based on diversified, sustainable development.

Alternative Resources and Energy Conservation: A full range of options and potential resource mixes should be considered. Preference should be given to sources of energy generation which have the least negative impact, locally, regionally and globally. The importance of dialogue between B. C. Hydro and the public, to educate both parties about environmental and resource planning issues, was emphasized again. Conservation is environmentally safe and economically conservative and its significant place in resource planning should be emphasized even further. Efficient generation and conservation of energy-producing resources are related issues: if you produce more efficiently, you conserve. Traditional and alternative resources should be studied with comparable commitments of funds and time.

Considerations: Some factors that stand in the way of energy conservation and the developing of alternative resources are the use of current average cost pricing policies; funds not being allocated for research and development (R&D) of alternatives and limited financial incentives for the development of new technologies.

Proposals: Use pricing policies and demand-side management to encourage conservation. Implement proposals like Power Smart and similar conservation-oriented schemes. Give a large, annual prize for significant energy-saving innovations. Make a corporate commitment to R&D for alternative resources. Provide and support financial incentives for desirable alternative technologies through legislation and taxation. Promote conservation with education, better marketing and packaging.

B. C. Hydro: Policies, Image, Roles: B. C. Hydro is acknowledged for its initiative in holding this Forum, which is seen as an important step in encouraging two-way communication. B. C. Hydro should continue to be pro-active, non-adversarial, and work to build trust and credibility. As mentioned before, B. C. Hydro is sometimes perceived to be inaccessible with a large bureaucracy. There is a perception that B. C. Hydro does not seek or want public involvement, and tends to avoid dealing with environmental and social costs because they are difficult to evaluate and controversial.

Considerations: There are several factors which counteract a positive image and an acceptance of policies and roles. There a lack of understanding and/or information around planning processes and policies, which is further complicated by confusion around governmental regulatory policies. B. C. Hydro is sometimes seen as wearing a number of hats, playing several roles, some of which appear to be in conflict: planner, marketer, supplier of electricity, protector of the environment. Prices and rates encourage waste and consumption rather than conservation. There is a perceived lack of a larger, long-term strategy.

Proposals: A number of strategies for B. C. Hydro were suggested in the workshops. For example, B. C. Hydro can encourage conservation at the front-end through pricing strategies and education; it can incorporate alternate resources into planning and development. Continued and pro-active efforts can be made to promote two-way communication, education and public involvement. Encouraging public scrutiny and incorporating external evaluation would increase credibility and build trust.

## CONCLUSION

In this overview, interfaces and interdependence among the significant issues become apparent. For example, forecasting, planning and development - the first issue - should include public involvement, education for conservation, consideration of social risks and factors and environmental protection, as well as alternative energy sources. Good communication and public involvement are important for the image, roles and policies of B. C. Hydro, for flexible and responsible forecasting and resource planning, for the effective assessment and inclusion of social risks and values.

The challenge of dealing with these issues can be seen as an opportunity to develop appropriate actions in response to vital environmental concerns. This Forum is an important step in this direction.

# SECTION 1.0 - INTRODUCTION

On the Thursday afternoon and Friday morning of the Forum the participants were divided into six working groups. The objectives of these working groups were to:

1. identify the key issues of concern to the people of B. C. with respect to energy development and the environment; and

2. initiate a process that facilitates public participation in future B. C. Hydro project planning, design, construction, operations and decommissioning.

The process used to run the working groups was designed to maximize the opportunity for participants to contribute to these objectives in as open a forum as possible. Given the large number of participants expected at the sessions it was crucial that the working groups agenda be well-planned and facilitated to provide maximum opportunity for contribution.

To prepare the participants prior to the Forum each participant received a briefing package (see Section 10.0 of these Proceedings) describing:

1. the current process for incorporating environmental issues into project planning;

2. the environmental issues currently of concern to B. C. Hydro with respect to hydroelectric, thermal, alternate and transmission projects; and

3. a description of the current resource development plan, including planning scenarios of energy supply and demand.

During the Thursday afternoon and Friday morning of the Forum the registered participants were divided into six working groups according to preferences they had indicated at registration. The participants in each working group were then assigned to a round table consisting of eight to ten people. Each round table had an assigned discussion leader and a recorder. Further, each working group was assigned one or more resource persons from B. C. Hydro, the Ministry of Energy, Mines and Petroleum Resources, and the Ministry of Environment. Overall control and direction of each working group was orchestrated by a professional facilitator.

Each working group held two workshops; one on Thursday afternoon and the other on Friday morning. The same group of participants met at each round table for both workshops.

On Thursday afternoon, the workshop focused on B. C. Hydro's long range planning. The two hour workshop period was divided into two distinct topics:

1. What are your concerns with B. C. Hydro's demand forecast and supply scenarios?
2. Who should be involved in long range planning? What should they contribute, and what mechanisms are recommended for involving them?

Approximately one hour was spent on each topic and the recorders used special forms to record the major conclusions emerging from the discussion. These forms were collected at the end of the workshop and used in preparing the report presented at the end of the workshop session.

On Friday morning each working group discussed the environmental issues related to one of three possible forms of energy generation: hydroelectric, thermal, and alternate; plus transmission. (Note: Two workshops were held on each of hydroelectric and alternate resources.) For each subject area the three hour period was divided into three distinct discussion topics:

1. Issues:

   What are the environmental issues in planning projects of this type? What are the priorities in terms of the long-term benefit to British Columbia, the need for immediate action, and what are the possible impacts?

2. Considerations:

   What are the considerations that must be kept in mind to resolve each of the key issues identified above?

3. Actions:

   What actions would resolve the issues? What are the specific tasks, who requests them, who can do them, and what result would indicate success?

As with the Thursday afternoon session, the Discussion Leaders were responsible for maintaining discussion focus and participation, and the recorders were given special forms for recording major conclusions. Again these completed forms were used after the Forum to help in the preparation of the working group reports presented below.

## WORKING GROUP REPORTS

The following reports are a synthesis of the discussions that occurred in each of the workshops. For the Thursday afternoon session we have synthesized the material into one overall summary of key points. This was possible since each workshop dealt with the same topic, albeit with different areas of focus. For the Friday morning sessions, we maintained the individual reports prepared by the facilitators after the Forum.

Any attempt at synthesis will likely result in the loss of emphasis deemed important by some participants. Where that has occurred in these reports we apologise since our only intention was to provide a readable summary from a large amount of information. We hope that we have done an adequate job that will satisfy most of those who participated. We thank all of the participants for their efforts and cooperation.

## SECTION 2.0 - LONG RANGE PLANNING WORKSHOPS

### 2.1 CONCERNS WITH DEMAND FORECAST AND SUPPLY SCENARIOS

The following characteristics of long range plans were identified as desirable:

- Development plans should assess social and environmental costs, and be designed complete with mitigation plans.
- Plans should be flexible, include benchmarks, and match supply and demand as these evolve.
- There should be an on-going review and follow-up procedure that recognizes change as a fundamental attribute.
- Strategic plans should be considered beyond a 20-year time horizon and should consider the finite nature of energy resources.
- The public should be informed regarding the assumptions, uncertainties, and alternatives available in long range planning, and have an opportunity to meet in future public forums to discuss the development of long term plans.

Concern was expressed about the role of B. C. Hydro in long-term planning. On the one hand, the same agency was perceived as projecting, supplying and manipulating demand. On the other hand, there was a perception of too many people and agencies are involved in the planning process. B. C. Hydro's ability to plan was perceived by some as limited by the fact that Hydro has no control over other markets or environmental assessment legislation. There was also some concern about interactions with the global community in terms of markets, prices, and in terms of environmental responsibility. There was some question about what Hydro means by sustainable development and a request for Hydro to take a lead in international discussion on appropriate growth rates for the developed countries such as Canada. It is regarded as a positive sign that Hydro is now engaging in demand-side considerations, conservation, and cogeneration.

#### (a) Forecasting

##### (i) Concerns Regarding Forecasting Methods

- Is Hydro using enough different forecasting methods or is it relying on one?
- Extrapolation of demand records is a poor way of forecasting compared to looking at specific mixes of industrial processes.

- Is Hydro comparing past forecasts with the ones presently offered relating actual demand today?

- Do forecasters evaluate experience of all utilities across Canada and compare forecasts?

- Forum participants are pleased that Hydro is becoming more flexible in its demand forecasting.

### (ii) Factors Not Adequately Considered in Forecasts

- Hydro's forecast of electrical demand is based on an econometric model which is deficient because it does not include climate and demographic changes caused by global environmental changes. Energy forecasts should incorporate some consideration of the national and global economy and the activities of neighbouring utilities.

- Forecasts do not account for all the things that drive energy growth; fast change is possible. For example there is a potential for industrial growth due to attractiveness of B. C. as a site for development. There is a need to examine the relationship between GDP and electricity growth demand.

- The impact of future energy cost increases are not adequately reflected in forecasts.

- Interaction between consumption of electricity and other fuels should be considered.

- Have power purchases and contributions through coordination with other utilities been adequately considered?

### (iii) Who Should Provide Input to Forecasts?

- There was a request to allow more public and industry input to the forecast, as it appears to be based on limited information (GDP, economic and population growth, historical relationships). Industry could provide more in-depth information. For example, Hydro could take advantage of the brain-storming potential of the IPPs.

- Customers cannot be considered accountable in making forecasts.

- How independent are Hydro's forecasts? Are there internal corporate or external pressures to show higher or lower forecasts? Since the forecasts are no longer scrutinized by BCUC on a regular basis maybe UBC and

B. C. Research could be involved in an annual review capacity.

(b) Uncertainty

- Basic uncertainty associated with long-range forecasting is caused by:
    - insufficient knowledge of parameters;
    - new developments in technology and implementation;
    - regulatory body interference;
    - other markets;
    - appropriate amount of forecasting.
- Predictions cannot be based on historical data; we have no way of knowing whether sustained growth will occur.

(c) Flexibility

- Flexibility should be a clearly stated objective of the long-range plan in order to incorporate unexpected changes in either supply or demand. For example, forecast demand could be changed overnight by a major electrically-intensive developer moving into B. C.
- Some flexibility could be provided by private industry. This would also minimize financial exposure.
- Hydro should be willing to take some risks; e.g. not have it's hands tied by fear of overbuilding.

(d) Assumptions

(i) Need For Information

- The public needs to be better informed regarding assumptions used in forecasts, specifically:
    - pricing scenarios;
    - population projections;
    - rate of industrial development;
    - political involvement;
    - basis of load forecast.

(ii) Are the Assumptions Realistic?

- The assumption of "abundant resources" may be out of date.
- Forecasts are based on perceived needs not real needs.

- Forecasts are now based on an economic load forecast developed by the government. This alone may not be adequate or appropriate to assess future demand.

(iii) Need for Review Process

- There should be a system of checks and balances on the underlying assumptions. Validity of assumptions should be checked through participation of public groups and possibly an independent government agency.

(e) Environmental, Social and External Costs

(i) Costs to be Considered

- There is a concern that the planning process may not adequately account for full environmental and social costs in choosing between resource alternatives. Selection is seen as biased to low-cost projects rather than to socially and environmentally acceptable projects.
- All forms of development should be tempered with a concern for the environment. Environmental criteria should be used to evaluate viability of projects. The environmental sensitivity of projects should be considered in ranking for scenarios.
- Wilderness preservation, especially wild rivers, should be included as a factor in reservoir selection.

(ii) Evaluations and Comparisons

- How can local concerns (e.g. preservation of rivers) be balanced with provincial needs for energy supplies?
- How can the impacts and benefits of fully developing one river be compared to partially developing two rivers?
- How can economic values be matched with environmental impacts?
- How can external costs be accounted for in project ranking?
- Should new projects be designed to result in no net environmental and social loss?

### (f) Pricing and Rates

#### (i) Price Forecasts

- Forecast prices are not likely to be any more accurate now than they were in the 70's. Future prices are related to competition for industry in the world market and marginal pricing policy.

#### (ii) Desirability of Higher Prices

- Current supply options are based on energy prices, especially industrial rates, which are too low. The existing rate structure may be counter-productive in terms of promoting appropriate conservation.

- Higher energy prices are perceived as the key to successful energy conservation. Benefits are expected from long-term marginal cost pricing.

#### (iii) Pricing Policy

- Marginal cost pricing is a politically explosive issue. We have to be aware of the political influence on pricing: the B. C. government sets policies and establishes the pricing process. Any new pricing mechanism would have to be, "phased in".

### (g) Large Scale vs Small Scale Projects

#### (i) Large Scale Projects

- have less impact on people and the environment than the equivalent energy generation from many smaller projects.

- can be partially financed through export contracts.

#### (ii) Small Scale Projects

- have less environmental impact compared to large resource developments such as the Stikine;

- allow more flexibility; can be brought on as needed rather than planned 12 years in advance;

- offer improved efficiency since equipment replacement with new technologies is less expensive;

- are based on conservative assumptions.

(iii) Strategies

- Consider strategy of adding a large project in the short-term followed by smaller project options.
- Since the difference between low and high forecasts is equivalent to the power from four Site C's, it would be better to approve projects in principle and then implement them as the actual requirement becomes more clear.
- Review the desirability of industrial investment in projects.

(h) Resource Mix

The favoured approach is a resource mix consisting of hydro, thermal, and alternative resources tailored to situations that exist in various parts of B. C. Considerations should include flexibility, environmental impacts and costs.

(i) Thermal

- B. C. has little experience with thermal generation of electricity.
- There is widespread concern with global climate effects from $CO_2$ emissions.
- If natural gas is preferred for heating and cooking, why is it not preferred over coal for thermal generation?
- No fuels except woodwaste and biomass should be used for electrical power generation.
- Coal is associated with an array of negative environmental impacts.

(ii) Municipal Solid Waste

- The cost of waste-based thermal may be higher than Hydro is willing to pay. The question then becomes, should we pay a premium for energy that comes from a plant that solves an environmental problem?
- There is concern with promotion of municipal solid waste electrical generation given that this is a significant disincentive to comprehensive recycling.
- Hazardous materials in municipal solid waste incinerators could have health effects.

(iii) Nuclear

- Why is nuclear energy not considered in B. C. Hydro's scenarios?
- Although nuclear is not desired now, a technological breakthrough may make it acceptable in the future.

(iv) New Technology

- The alternative resources scenario is deficient in not acknowledging emerging technology such as fuel cells and low-head tidal.
- Hydro should fund more research on alternatives such as tidal and solar.
- We should buy time with aggressive conservation measures until more acceptable options become available through new technology.
- Emerging technologies may render existing or planned facilities obsolete or uneconomic?
- There are some concerns regarding uncertainty and reliance on soft energy sources.
- Environmental impacts may be overlooked in the alternative scenarios. Alternative projects should be environmentally sound.
- "Small Hydro" development is listed with alternative resources. Is it being given a sufficiently large portion of the "alternative energy" pie?

(v) Specific Resource Selection Concerns

- Site C appears to be a high priority choice, but its selection should still be open for discussion. How long can it be postponed by conservation, given the lead time required for engineering and construction?
- Hydro should consider leaving Stikine as a wilderness area.
- The Stikine and Iskut developments should be treated as separate projects, since they have very different impacts.
- Available resources should be coordinated so that resources available at a low period in one region supply

the peak demands in other regions (e.g. interprovincial). The coordination schemes with BPA, TransAlta or Alcan should be included in the supply scenarios.

- The supply scenarios in the Resource Plan no longer contain the return of the Columbia River downstream benefit energy. How will downstream benefits affect sales by IPP's?

### (i) Demand Side Management

- "Incentive pricing" should be used to suppress or shape demand. Incremental or marginal energy prices would create pressure for energy-efficient industrial concerns and residential process applications, and construction techniques. This would delay the need for project development. Why does Hydro maintain a declining rate structure?
- Only the alternate scenario shows rate increases at a rate faster than inflation. Is this a way of showing that a rate increase is necessary in this scenario?
- Hydro's present forecast rates of use show that we will need all identified resources by about 2040. Can we influence growth rates?
- We could get along with much less electricity if we really wanted to, society on a whole needs to rethink its needs and values with respect to electrical energy.
- Conservation, although 100 percent beneficial, is only a partial solution to supply scenarios.
- There is concern that Power Smart energy savings won't be maximized. There appears to be a lack of will by the public to implement energy saving programs.
- Energy savings available through Power Smart are uncertain. There is a danger of future power shortages if we depend on such uncertain resources.

### (j) Export and Import

#### (i) Export

- There is a great deal of concern regarding neglect of environmental impacts in Canada which would be caused by projects built to satisfy U.S. demand and concern that export will create pressure from the U.S. to push for energy developments in B. C. earlier than we might prefer. It is felt that an export policy would discourage conservation.

- Why are we even considering export when we should be focusing our energy resources into local/provincial projects that generate added value?

- We should be more forward-looking in terms of building for export.

- We could import energy to satisfy short term excess demands.

### (i) Utility Transfers

- More East-West energy coordination in Canada was recommended, with more emphasis on inter-utility transfers and coordination with Alberta and BPA. The possibilities of inter-provincial trade are understated in the resource plan (Alberta coordination is mentioned like the tip of an iceberg).

- There is a risk associated with the dependence on Alberta power in the present plan that must be considered when coordinating energy sources.

### (ii) Strategy Development

- The export of power should not be separated from the domestic demand as this tends to oversimplify the issues.

- Export contract terms should be linked to future domestic needs; i.e. domestic opportunities should not be limited by long term export contracts.

- An analysis is needed concerning the effect of transmission ties with the U.S. on new resource requirements in Canada.

- Public discussion on the energy export issue is required.

## (k) Communication Concerns

### (i) Communication Needs

- The public needs to be informed regarding the assumptions used in:

- pricing scenarios;
- population projections;
- rate of industrial development.

- There is no Freedom of Information Act in B. C. so some people experience great difficulty getting information from Provincial Government and its agencies.

- There is a lack of information available about Hydro's Resource Planning Process.

### (ii) Recommended Revisions to Materials

- The public perceives a contradiction in leaving lights on in a public building such as B. C. Hydro Head office while the Utility is requesting energy conservation.

- Demand projections should be expressed in terms of industrial growth, population growth, etc., not percentage increase in electrical consumption.

- Demand-side considerations should not be expressed as "supply" but by adjusting demand curves downward. Similarly, the alternate resource scenario should be shown as a reduction in load forecast.

- The demand curve looks preconceived, always sloping up with no dips.

## 2.2 CONCERNS WITH PUBLIC PARTICIPATION

There is a strong desire for public participation in long-range planning. A majority expressed a desire or need for the public to be involved, but a few felt this was not desirable. Comments specific to various groups are listed in this section, including suggestions related to what that group can contribute and mechanisms for involving them.

### Group Specific

- Appropriate communication and planning mechanisms should be developed for each group involved in the planning process.

- A layered approach is recommended, where Hydro can speak with each group separately and make sure they feel at ease.

- There should be round table talks with all groups concerned.

- Hydro must help educate participants in terminology, acronyms, etc., so that large meetings such as the Forum won't intimidate participants who do not have a technical background.

- There is a strong concern that industrial information must be kept confidential.

Process

- There is a need to develop processes which include both project and long-term planning.
- Government, industry and the public should work together to determine long-range goals and determine what each is willing to pay for the kind of future they want. For example, are people willing to pay extra to avoid development in the Stikine? If so, will they have any guarantee that development will not take place a little later?
- Use a set of key groups to define issues and develop options and then present these to a broader public.
- Use a non-partisan board or panel to provide a decision-making approach based on all inputs made by various groups.
- Look to BPA and the Pacific Northwest Power Planning Council as an example of how public input can be gathered for long-range planning.

(a) "General" Public - Individuals

- Anyone who wants to be involved should have an opportunity.
- Hydro should go to the public, not expect public to come to Hydro.

(i) Contribution

- priorities;
- information;
- help makes making the diversity of social values more evident;
- contribute conservation ethic;
- understanding of local issues and interests;
- promote consensus opinion on "cost" of a natural resource;
- public willingness to pay;
- criticism of options expressed in documents;

- a broad band of suggestions, ideas, and alternatives that could be adopted;
- the public education process (word-of-mouth, support of, etc.);
- standards of quality.

### (ii) Mechanisms for Involvement

The public should be involved in the early stages of project selection and development, and should have an opportunity to discuss plans before decisions are made. There was also a desire for a process that would allow the public to link planning activities and social values.

#### A. Discussion Meetings

Large meetings are perceived to be good for speechmakers, but not for participation. The roundtables and workshops at the energy forum were recommended as a suitable process, as were small, informal consultations. Smaller, regional discussions between Hydro representatives and the public are requested. These should include:

- information sessions supported by experts in the field;
- discussion of an array of options rather than focusing on a specific project;
- preferences on supply and demand options;
- solicitation of series of questions to focus on issues;
- participation by people with opposing view to ensure an open discussion.

#### B. Information Distribution

- mass media communications;
- educational programs, e.g. Knowledge Network, and Commonwealth Knowledge Network;
- publications suitable for public;
- open houses.

C. Support

Many requests were made for a mechanism to fund public involvement supported by professionals. For example:

- equal "air time" for individuals to be able to counter corporate messages;
- intervenor funding;

D. Feedback

The need for a broad-base mechanism to facilitate feedback from the public was expressed, as opposed to feedback from those who are able to be deeply involved. This could be achieved by independent surveys, statistics, opinion polls, or by sending out questionnaires with Hydro bills to solicit opinions.

E. Formal Processes

Many different formal processes were proposed as possible mechanisms for public participation. In general a desire was expressed for a regular, consistent, fair, and understandable approach. For example:

- consumer panels that study issues over six to eight months interactively;
- a joint forecasting system, similar to the BPA process: "NW Forecasting";
- formal hearings, both project-specific and on general planning strategy;
- Royal Commissions;
- B. C. Utilities Commission;
- advocacy and political pressure groups.

(b) "Select" Public - Local Communities

(i) Contribution

- local values;
- definition of impacts to local people, economy, and environment;
- land-use concerns;

### (ii) Mechanisms for Involvement

There is a need to set plans, guidelines and milestones for this process. It should begin as early as possible and continue as an on-going dialogue. Meetings should be held in local communities. The overall process should include: newsletters; information packages of available alternatives; up-to-date information banks at local libraries; meetings for discussion with Hydro representatives; time to consider alternatives; and the opportunity to provide input, e.g. through a public hearing.

## (c) "Select" Public - "Environmental" Groups

### (i) Contribution

- environmental and social concerns;
- long-term views, intergenerational viewpoint;
- non-market benefits, values;
- expert knowledge in specific areas, in particular active, contemporary, environmental knowledge;
- keep system honest.

### (ii) Mechanisms for Involvement

In general the same mechanisms apply to this group as apply to the general public described above (Section 2.2(a)) the "select" publics; the following points are those specifically mentioned with respect to this group: forums, public hearings; direct contact; newsletters; open houses; and surveys and studies.

## (d) "Select" Public - Native Indian

### (i) Contribution

Native Indians were not well represented at the Forum, hence the discussion was limited. It was pointed out that they have a different outlook and should be asked for alternative solutions to energy related issues. Openness on their part was also considered desirable, with a request that native Indians communicate their objectives and long range plans.

### (ii) Mechanisms for Involvement

Both a direct approach to native Indians, and their inclusion within the general public framework were advocated.

(e) "Select" Public - Students, Youth

(i) Contribution

The perspective of these stakeholders in the longer term future was considered valuable for long-term planning.

(ii) Mechanisms for involvement

The educational system is important in involving students. Individual teachers were seen as capable of providing leadership and involvement. Environment and energy issues could become a significant part of the grade 12 geography curriculum. Course credits or allowance for class time should be provided for student participation in the public process, science fairs and open houses.

(f) Hydro Staff - General

(i) Contribution

Hydro staff can provide an array of technical expertise, data, and field experiments. They also provide the main contact between Hydro with the public.

(ii) Mechanisms for Involvement

Increased education of Hydro staff was perceived as necessary in order to capitalize on the staff contribution. In particular staff could gain experience from each other and task groups, pilot project groups, etc. could be convened.

(g) Hydro Staff - Planners

(i) Contribution

Many perceived the Hydro planners as a focal point in any program involving long-term planning. They would be responsible for providing draft plans or scenarios and for tying the package together after the consultation process is complete. Planners were also asked to allow for: consideration of nuclear power in plans; broad brush scenario past 2022; and planning procedures and tools for Hydro use.

(ii) Mechanisms for Involvement

Hydro planners would be involved through an internal Hydro process.

(h) Industrial Users

(i) Contribution

Industry information is sensitive to the competitive market, and hence confidentiality would have to be continued. This group would be concerned with: load requirements, based on their future plans, which would contribute to forecast accuracy; end-use data; process information; technical options; contingency plans; conservation ideas; cogeneration options; industry priorities, and their willingness to pay; growth and employment potential; and initiative and creativity.

(ii) Mechanisms for Involvement

As any other public body, industry should participate in forums, hearings, special meetings and avail themselves of media communications. Mechanisms further to this could include: presentation of proposals to Hydro; interviews with Hydro staff and consultants; and use of existing bodies such as the Council of Forest Industries, mining associations, etc.

(i) Industrial Suppliers

This category includes suppliers of parts and materials as well as independent power producers.

(i) Contribution

- research and new technology;
- initiative and creativity.

(ii) Mechanisms for Involvement

- expressions of interest to determine what the options are;
- forums, hearings, media.

(j) Consultants

There was little discussion of the role of consultants; the points mentioned included:

(i) Contribution

- understanding of environmental and social concerns;
- contemporary environmental knowledge;

- expert knowledge in specific areas.

(ii) Mechanisms for Involvement

- participation in interdisciplinary planning within Hydro;
- participation in and facilitation of forums and public hearings;

(k) Government, Provincial

The basic contribution of the provincial government was seen to be policy formulation with the responsibility for stewardship of resources. There was also a concern that the government limits innovative projects and input to development plans.

Specific requests included:

- define sustainable development - a process may need to be developed in order to achieve a satisfactory definition;
- provide enhancement;
- reduce bureaucracy;
- increase communication between agencies;
- reverse declining rate structure.

(i) Mechanisms for Involvement

The government should be a participant in various public processes such as forums, hearings, newsletters, etc. It was also seen as fundamentally involved in resource development through the electoral process. Better involvement could be fostered through developing interministerial contacts (e.g. round tables) on a regular basis which would provide more cross-talk at the working level. Five-to ten-year reviews of energy planning were proposed. The role of the B. C. Utilities Commission was considered, but not clarified.

(l) Government, Municipal

(i) Contribution

- knowledge of local issues and policies;
- local land use concerns;
- consensus of community concerns;

- growth rate information.

(ii) Mechanisms for Involvement

Further to the general mechanisms for involving local communities (meetings, forums, newsletters, etc.), special meetings hosted by the local government were suggested.

Direct contact between municipal governments and Hydro were recommended with a view to increasing cooperation in planning.

(m) Extra-provincial Groups (e.g. Province of Alberta, Yukon Territories)

(i) Contribution

If we are considering exports at all, we should include the representatives from outside B. C. in developing regional forecasts and in the decision processes. These people would contribute knowledge on:

- trans-boundary effects;
- demand needs.

(ii) Mechanisms for Involvement

- round table talks.

(n) International Bodies

This group would primarily contribute an awareness and understanding of global concerns.

(i) Mechanisms for Involvement

- forums; international and local.

(o) Media

(i) Contribution

Media are the greatest source of information to the public, and hence there should be a special effort to involve them in an information program. Media plays three distinct roles:

1. reporting;
2. influencing opinions (e.g. editorials);
3. analyzing issues, public concerns, data.

(ii) Mechanisms for Involvement

Provide information to local and regional newspapers, radio, community television, etc.

### (p) Multi-Group Processes

Although it is desirable to initiate some links directly between Hydro and specific groups, there is also a need for a process that will involve a broad selection of different interests. This would promote mutual understanding and insure resolutions developed are more generally acceptable. One suggestion was System Planning Hearings modelled on Alberta ERCB Natural Gas Requirements Hearings. The intention is to establish an organization which would allow participating groups to plan in a coordinated fashion.

(i) Groups to Involve

- major customers;
- business;
- advocacy groups;
- regulators;
- government;
- environmental groups;
- local communities for local projects;
- taxpayers;
- energy users and producers.

All the contributions discussed under each group heading above would presumably be available to the multi-group process. Contributions which were mentioned within the multi-group context included:

- identification of impacts and new alternatives;
- local information;
- ideas and unexpected proposals which turn out to be innovative;
- documentation of views of participants;
- provincial, national, and international focus on options.

(ii) Mechanisms for Involvement

A multi-group process could be funded by industry, Hydro, and the public. A variety of mechanisms were mentioned, ranging from round table talks to formal hearings. If there were to be hearings, explanatory meetings would be desirable prior to the hearing. This would allow respondents time to understand what the options are and to think through what they may wish to present at the hearing. Some people felt that formal hearings were preferred to public meetings - presumably since they are designed to result in decisions - but requested that they remain informal enough not to require legal representations.

## 3.1 WORKSHOP #1: HYDRO PROJECT PLANNING

### Issues

The issues defined by the workshop centred around the following concerns:

- Environmental;
- Economic;
- Information;
- Planning;
- Social.

### (a) Environmental

The specific impacts identified and considered included:

- Fisheries: There is a general lack of good baseline information available on fishery matters. This could greatly hinder management's ability to detect and respond to change.
- Arable Land: In a world perspective, available arable land is limited and irreplaceable. Flooding takes land out of the world inventory of farmland.
- Ecological Effects: Alteration of wildlife and landforms are a predictable effect of dam construction and should be better incorporated into project assessment.
- Water Supply and Quality: Potential irrigation sources should be protected. Public health issues (mercury or other pollution) should be identified, monitored and mitigated.
- Forestry and Wildlife Resources: Habitat and ecosystems are altered by dam construction, transmission and flooding.

### (b) Economic

- Are the new energy projects suggested by B. C. Hydro really needed?
- Is B. C. Hydro able to react quickly to changes in consumer demand?
- What is the feasibility, economic preferability, and impact of smaller projects?

- Inexpensive energy made available to attract industry to the province is seen as positive, but the favourable industrial rate structures encourage wasteful energy use.

- The economic values of environmental protection and sustainable development are very difficult to quantify.

- The economic impacts and benefits of energy development are unequally distributed.

- It is very difficult to put a value on intangibles or resources that are in remote regions.

(c) Information

- Restraint in government spending has reduced the government's ability to evaluate decision-making processes as they relate to resource use.

- B. C. Hydro is perceived by some to be a non-receptive to external input.

- Future energy developments must include a co-operative planning approach including wide public input at the early stages of project planning.

- The general public has very limited access to project information, and there is no general understanding on how the public can provide input into Hydro's plans and assessments.

- Government does not seem to encourage two-way communication or public involvement in resource planning.

- An up-to-date baseline or inventory of information on any of the issues areas is not generally available.

- There is a need to understand both project issues and specific mitigation measures. The public can evaluate only when it is informed about the trade-offs.

(d) Planning

- The public require information on (1) the process of developing energy sources; (2) the options being considered; (3) possible mitigation and compensation options; and (4) the predicted environmental effects.

- What is the likelihood of catastrophic dam failure, and what contingency plans are in place?

- Early information and involvement and policy clarification would strengthen public acceptance of large projects.

- Coordination of multiple uses should occur in early planning stages so that practical solutions can be developed.

- More comprehensive planning approaches are required to take into account global effects and the various biophysical, social and economic changes that could occur over the planning period.

(e) Social Concerns

- Native Indian land claims are insufficiently addressed in B. C. Hydro policy and implementation.

- B. C. needs a predictable policy framework which survives government changes to ensure the province can create and conserve benefits over the longer term.

- Social impact assessment is a necessary procedure to monitor project effects.

- Social values are difficult to quantify and are therefore often overlooked; e.g. archaeological sites, aesthetics. These need to be protected.

Consideration

The major barriers impeding progress toward resolution of these issues are:

- Government Ministries

  Government ministries need to be better informed, and interlinked to ensure provincial policy on energy and environment provides a suitable framework for sustainable development.

- Public Consultation

  People do not know how to get information, or how to participate meaningfully in the energy development process. More signals are needed to help the public identify how they can contribute.

- B. C. Hydro Planning and Monitoring Practices

  Hydro's research and development program is under-funded. Its rate structures and need projections were thought to be unilaterally determined without consultation or debate. Late decisions on priorities and options undermined public confidence in the planning process. There was concern that the Board of Directors was ruled by a few and might not be representative of diverse interests. Overall it would appear that the general public seems not to understand Hydro's limitations and constraints.

## Actions

Several action plans were proposed to improve energy development and provision in the province. The following measures were suggested:

- B. C. Hydro should pro-actively initiate open, participatory watershed planning on an ongoing basis.
- B. C. Hydro and the federal and provincial governments should evolve legislation which protects the watersheds, and can serve as a policy foundation.
- Governments should initiate and support inter-governmental and inter-department consultation.
- B. C. Hydro and government should provide education on how energy is developed and provided in the province.
- B. C. Hydro should work in cooperation with smaller producers to achieve mutual goals and protect the interests of the private sector.
- The public at large should work co-operatively with government and industry to protect and conserve agricultural, water, and forest resources.
- Impartial groups independent of government should be appointed to gather data, assess risk, and address issues for major projects. B. C. Hydro could act as a catalyst to influence the formation of such groups.
- The electorate should force the government to develop and publicize new energy project application processes.
- A balanced, consistent, predictable approach to environmental cost/benefit analysis and monitoring should be instituted by government and industry.
- B. C. Hydro should work harder on mitigation and enhancement of its existing facilities in an effort to demonstrate benefits and decreased negative impacts of future developments.

## 3.2 WORKSHOP #2: HYDRO PROJECT PLANNING

### Issues

Each of the issues listed have been summarised from a constellation of ideas produced in Hydro Group 2 workshop. In most cases there are two levels of issues - at a general level and at specific levels or subsets within the generality. There is a small paragraph at the end of this report for all those issues for which there was not time for discussion and resolution.

For each issue the barriers and recommended actions have been discussed. From the specifics of the discussions it has become obvious that the overriding question that needs to be examined is: does British Columbia require this continued amount of power from hydroelectricity?

### (a) Validating the Need for the Electricity

Subissue 1: how accurate are the load forecasts?

Subissue 2: how does B. C. Hydro justify its projects to the public?

Subissue 3: why are new projects developed when existing ones could be expanded? How does B. C. Hydro maintain the balance between the two?

#### Consideration

- There is a lack of money and time to discuss the load forecasts with the public.
- There is no requirement by regulation either under the Utilities Commission or through the Ministry of the Environment that the public be consulted or these issues be discussed with them.
- B. C. Hydro has many roles and is often perceived as being in conflict of interest with itself.

#### Actions

- Have open discussions with the public as to whether projected loads are required or not.
- Carry out these discussions in formally-run public meetings using the "round table" model not through the use of open houses.
- Monitor public issues through the use of small and large scale polling techniques, either through piggy-backing on

already existing polls or through the use of smaller-scale regional polls.

(b) Evaluation of Environmental and Social Issues

Subissue 1: it is very difficult to quantify the social and environmental value of natural resources

Subissue 2: there is difficulty in placing a value on the following:

social: relocation of communities, archaeological and tribal concerns;

environmental: flooding land, particularly that which was agricultural; endangered species (e.g. the grizzly) the effects of reservoir seasonal draw drawn upon on fish populations; aesthetics - visual impacts.

Subissue 3: accounting for all the costs when evaluating a new project is problematic.

(i) Considerations

- There are presently inadequate mechanisms and methods to determine the trade-offs over land-use issues. It is difficult to account for all the costs.
- Some values are inherently unquantifiable and subjective - how are these dealt with?
- There are differing value systems. How do you discover the bases for these differing values and attempt to reconcile them?
- There is a perception that B. C. Hydro is unwilling to discuss the issues of evaluation of social and environmental costs in public where there can be public response and input.

(ii) Actions

- The trade-offs over land-use issues would be greatly helped by a comprehensive land-use strategy to be developed by the government.
- Ecologically sensitive areas should be identified and some regions should be placed out of bounds for development of any sort.

- Intangibles should be given greater weight when making decisions.

- Instead of not allowing public review of documents due to concern of inaccuracy of projection - then Hydro could allow public discussion of figures expressed on order of magnitude basis. This would facilitate greater understanding of the comparative size and weights of issues facing development of further hydroelectric resources, and the accuracy of Hydro's projections could be reviewed.

### (c) Data, Information and Communication

Subissue 1: available data on resources and energy are inadequate to make trade-off decisions. We never have enough data to back our decisions since there is no baseline information.

Subissue 2: there is a need for better communication between Hydro and the public, regarding policies and data.

#### (i) Considerations

- The necessary data do not exist.

- Current and historic data on hydrological cycles are needed.

- Public opinion data are inadequate.

- There is a general distrust among stakeholders.

#### (ii) Actions

- To obtain information on public attitudes use focus groups to sample the range of opinions. The focus groups can consist of experts or local community people. Also use public opinion surveys.

- Look at other exercises that have worked in B. C. and model B. C. Hydro's response after the successful cases.

### (d) Lack of Clarity about the Role(s) of B. C. Hydro

B. C. Hydro seems to play several roles:

- marketer of electricity;
- planner of the Province's resources;
- supplier of a source of power within the province;
- protector of the environment.

(i) Considerations

- There is not a clear understanding of the mandate of the company by the general public.
- The size of the B. C. Hydro bureaucracy is seen as a barrier. In some situations it is too large to penetrate. At other times it is seen too small to be able to get the job done properly.
- B. C. Hydro has too many roles and is therefore suspect.
- There is a perception that B. C. Hydro's mandate does not reflect current issues and public values.

(ii) Actions

- Clarify B. C. Hydro's mandate. It should be clearly written and communicated to its Board of Directors, staff and public.
- When written, it should be publicized in a way that is easily understandable to a range of audiences.

(e) There Appears to be no Overall/Larger B. C. Hydro/Government Strategy to Deal with the Issue of Equity

Subissue 1: short-term requirements vs long-term needs: how much does the community have to pay now to ensure long-term provision of electricity? How much disruption to the community does it cause to build a dam that will not be operational for 5 years? Projects seem to come on-line in large chunks.

Subissue 2: distribution of benefits: There must be a balance in local vs. regional/provincial or country needs.

Subissue 3: downstream vs. upstream needs: Farmland and communities upstream of the dams are disrupted for downstream users.

(i) Barrier

- There is a lack of a larger regional and international strategy to deal with these inequities.

(ii) Actions

- Develop smaller projects so that the effects will not be unevenly divided;

- Co-generate alternative forms of electricity so they can be developed on a province-wide basis and their effects be more equitably dispersed;
- Use preferential rates for electricity to those industries that decide to develop in the local region near where the power is being generated. The economic development and jobs will off-set some of the economic hardships disruption has caused.

(f) Environmental Impact Assessment and Public Consultation

Subissue 1: there are problems with the Environmental Impact Advisement (EIA) system as it is currently practised in B. C. and Canada.

Subissue 2: to date, public consultation activities have only been one-way communication from B. C. Hydro to the public. Hydro appears to have little capacity to receive and handle information from the public.

(i) Considerations

- There is often lack of public information on the decisions of electricity and project development.
- The baseline data are often incomplete, making the development of an accurate EIA difficult.
- There is not yet a workable process to involve the public in project planning.

(ii) Actions

- A pro-active group is needed within B. C. Hydro to deal with public issues and help build public consensus.
- There is a need to set up regional forums, in the form of roundtables, to gain public input. Use techniques which ensure that all views are heard.
- Hydro needs to become pro-active on Native Indian issues. Hold the next B. C. Hydro forum on native Indian issues.
- Approaches from other jurisdictions such as the Bonneville Power Act should be reviewed and a process based on their experience should be developed.

## 3.3 WORKSHOP #3: THERMAL PROJECT PLANNING ISSUES

Three key issues were discussed in the workshop. These are summarized as follows:

1. The key environmental issue for thermal generation was conceived by participants to be the same as the issue for all forms of energy production: What form of energy source generation has the least negative impact locally, regionally, and globally?

   Subissue 1: imperfect forecasting of effects;
   Subissue 2: uninformed public perceptions;
   Subissue 3: limited long-term supply of the nonrenewable resource;
   Subissue 4: the greenhouse effect;
   Subissue 5: handling, storage and disposal of wastes.

2. There is concern about regulatory processes intended to protect the environment.

   Clear policy direction should be the government's task, and enforcement of responsible environmental practices is necessary. Government indecisiveness was perceived to lead to planning inconsistency in the input to development processes.

   Subissue 1: the current ineffectiveness of public involvement in energy development;

   Subissue 2: the intimidating atmosphere of public information programs now used by industry and governments.

3. Efficient generation and conservation of energy-producing resources are related.

   The group focused on thermal generation and their specific concerns were as follows:

   Subissue 1: the possibility of Hydro overbuilding resources could be reduced through purchases of firm power from interconnected thermal systems.

   Subissue 2: thermal facilities should only be permitted where a net reduction in emissions can be demonstrated, e.g. Resource Smart programs.

   Subissue 3: rate incentives should be introduced to encourage industry to locate near generation sites, thereby reducing transmission line impacts and costs.

   Subissue 4: the best available technology should be introduced to increase overall system efficiency.

(i) Considerations

Overall situations were identified as impeding resolution of the issues and concerns:

- Available technical information is not widely understood by the public.
- The impacts of thermal generation are widespread geographically, and comprehensive monitoring is difficult. Coordination of data and interpretation through R&D is open to various external influences and interventions.
- Polarization of special interest groups impedes progress toward issue resolution.
- Economic values may conflict with other widely held values: environmental, risk reduction, health.
- Public hearing processes are perceived as intimidating. There are "credibility gaps" between corporate, public and private interests due to historic circumstances and past misunderstandings.

(ii) Actions

The following actions were recommended:

- Information for public consumption should be prepared in laymen's language, and should be widely distributed by companies, regulators and researchers.
- A wide dialogue should be initiated, using all available means of communication, involving the public, educational institutions, government and other companies, to allow issues to emerge and be resolved.
- Based on the premise that the public is well-informed, systematic public consultation should systematically be undertaken by Hydro.
- Public disclosure of planning directions, continuous information and communication on company developments, and policy consistency and regulatory enforcement would restore credibility.

(iii) Summary and Conclusion

The public requirement to be informed and involved was stated within the topic areas as an issue, an opportunity, and an appropriate action in response to environmental concerns.

There was an explicit need for greater public involvement in policy and planning, through Hydro informing, listening, interfacing, and responding to all affected groups and stakeholders.

## 3.4 WORKSHOP #4: TRANSMISSION PROJECT PLANNING

### Issues

The issues presented here arose out of discussions in the workshop concerning transmission lines. It is based on the work of the discussion leaders and recorders at each round table in the workshop. Six major issue areas were discussed:

- Electric and Magnetic Fields;
- Public Information and Consultation;
- Planning for Future Needs;
- Social and Environmental Costs of Transmission Lines;
- Use and Maintenance of Right-of-Ways (ROWs);
- Visual and Aesthetic Impacts.

Under each of these, main issues more specific subissues were developed and barriers and actions identified.

### (a) Electric and Magnetic Fields

Subissue 1: lack of consensus between the public and scientific community regarding the health effects of electric and magnetic fields (EMFs).

### (b) Considerations

- This is an emotional issue.
- There are no definitive answers in the scientific literature.
- There is no credible source of information.
- There are significant cost implications to B. C. Hydro for rerouting lines or relocating residents.
- The public has very little information on EMFs.
- The media exaggerates the dangers of EMFs.
- B. C. Hydro has not been pro-active on this issue (e.g. developed a corporate policy in advance of projects).

### (c) Actions

- Give the public a choice (e.g. whether they want to move).
- Provide public with more information about EMFs.
- Involve independent scientific experts to review and debate.

### (b) Public Information and Consultation

Subissue 1: lack of public knowledge and understanding of B. C. Hydro's resource planning process and underlying assumptions (especially regarding requirements for maintaining system reliability, and the various project options).

Subissue 2: perceived lack of motivation on the part of B. C. Hydro managers to deal pro-actively with public concerns.

Subissue 3: low level public support for needed projects, with the result that B. C. Hydro currently has a low level of credibility with the public.

Subissue 4: apparent rigidity of project schedules.

Subissue 5: anticipated difficulties in negotiating of appropriate compensation for Native Indian Bands, especially given land claims and history of poor relations with B. C. Hydro and the government.

#### (i) Considerations

- The public is generally apathetic.
- There is a perceived technical rigidity about the way things are done.
- Public consultation processes on earlier projects have not been credible.
- No clear and consistent policy statement from B. C. Hydro regarding public consultation has reached the public.

#### (ii) Actions

- Develop a better understanding of public concerns (e.g. through focus groups).

- Develop a B. C. Hydro policy on public consultation.
- Consult with all stakeholders early in the process.
- Undertake a public information and consultation program on the resource plan.
- Develop corporate information/consultation strategy which fosters the involvement of a wide range of interest groups.
- Provide ongoing public information, especially on the options for energy generation and transmission and the tradeoffs.
- Involve the public in B. C. Hydro decision-making. This will result in better decisions.
- Train B. C. Hydro technical staff in communication skills.
- Pay leases for rights-of-way on an annual basis to increase acceptance of B. C. Hydro rights.
- Encourage industrial energy users to anticipate demands and consult with B. C. Hydro regarding future needs.
- Establish annual industrial and residential awards for Power Smart.
- Develop and implement education programs from elementary school levels through graduation.
- Place a surtax on energy rates to pay for public education.

### (c) Planning for Future Needs

Subissue 1: the need to focus on demand side management, as a way of reducing need for additional transmission lines.

Subissue 2: the siting of new generation projects near load centres to avoid long transmission lines.

Subissue 3: the need to start planning now for future transmission (e.g. land-banking for corridors to supply Lower Mainland and Vancouver Island, initial construction of double circuit lines in anticipation of future demand).

Subissue 4: use of higher voltage transmission lines, resulting in fewer lines required.

Subissue 5: possibility of upgrading existing lines rather than building new lines possibly resulting in higher capacity and less land alienation.

Subissue 6: the export of power and its relationship to transmission projects in B. C.

(i) Considerations

- There is public opposition, especially by individuals who resist any kind of development.
- Clear government energy development policy seems to be lacking.

(ii) Actions

- Reduce needs for electricity, encourage others to recycle, think small and efficient. Involve community leaders in the education process.
- Focus on east/west links for transmission.
- Change rate structure to reflect true costs (e.g. of transmission). Move away from postage-stamp rates.

(d) Social and Environmental Costs of Transmission Lines

Subissue 1: maintaining equity and fairness, given that transmission lines burden one area to the benefit of other areas.

Subissue 2: difficulty in identifying and measuring the social and environmental costs associated with transmission lines.

Subissue 3: need to provide people living adjacent to transmission lines with some benefits (e.g. Manitoba Hydro has provided Indian bands near the DC lines with restricted use diesel).

Subissue 4: economic impact of transmission line construction on communities (e.g. boom and bust cycles).

Subissue 5: deciding whether transmission lines should be located in already-developed corridors or away from people (e.g. through pristine wilderness areas).

(i) Considerations

- There are no standards for measuring non-economic factors in cost-benefit analysis.
- There are costs to B. C. Hydro and ultimately to the consumers.
- There is lack of corporate policies governing compensation.

(ii) Actions

- Develop a qualitative model for analysis of social and environmental costs.
- Develop compensation/mitigation standards.
- Involve the public more directly in identifying and assessing costs and benefits.

(e) Use and Maintenance of Right-of-Ways (ROWs)

Subissue 1: difficulty in ensuring the multiple use of the transmission line ROWs given corporate concerns about security and maintenance costs.

Subissue 2: the viability of existing agreements and easement arrangements along ROWs. (Do utilities have those rights? Can they be acted upon?)

Subissue 3: impacts of increased access on wildlife (e.g. barriers to movements in deep snow).

Subissue 4: use of herbicides on ROWs.

Subissue 5: competition for land within corridors and especially the valley bottoms. (If transmission lines are located in an area, what used are precluded?

(i) Considerations

- regulatory requirements (e.g. Parks).
- safety concerns about using ROWs, especially with respect to EMFs.
- lack of public understanding of existing agreements and potential uses of ROWs.

(ii) Actions

- Establish linear corridors for utility use (e.g. highways, pipelines, transmission lines).
- Use soil classifications and forestry values in comparing transmission options and alternatives.
- Locate ROWs to minimize visual impacts and reduce negative effects on wildlife.

(f) Visual and Aesthetic Impacts

Subissue 1: visual impacts of transmission lines.

Subissue 2: poor design of the towers from an aesthetic perspective.

(i) Considerations

- cost of underground transmission lines;
- public opposition to transmission lines in developed areas;
- difficulty in quantifying impacts, as they are highly subjective;

(ii) Actions

- Paint the towers with less visible colours.
- Develop less intrusive tower designs.

## 3.5 WORKSHOP #5: ALTERNATE RESOURCES PROJECT PLANNING

### Issues

The issues presented in this section arose out of discussions about alternate energy resources at the roundtables during two separate sessions at the forum. This summary is based on the work of the discussion leaders and recorders at each of the roundtables.

(a) Currently Site C is Presented as a Definite Component of B. C. Hydro's Resource Plan

(i) Considerations

- The assumption that Site C will be one of the next major projects to be developed is a barrier to more creative thinking on alternative ways to provide the needed energy.

(ii) Actions

- Provide for meaningful planning by not constraining the resource plan to only include Site C and the Lower Columbia.

### (b) More Research is Required Before Meaningful Choices can be made on Alternative Energy Options for B. C.

(i) Considerations

- There is a lack of time and money available for energy research.

(ii) Actions

- B. C. Hydro should do more research and development and encourage more government funding to better evaluate alternate energy technologies.

### (c) There is a Need to Study Traditional Resources and Alternative with Equal Commitment of Funds and Time

(i) Considerations

- There is a lack of sufficient resources or policy commitment within Hydro to explore alternate energy technologies.

(ii) Actions

- Enact appropriate legislation.
- Establish independent research group.
- Provide additional funding to study the alternate energy sources.

### (d) Global Warming - Effect on Alternate Resources and Entire Pacific area of the Continent

- Global warming could potentially affect the desirability and cost of alternate energy resources throughout the region.

(i) Considerations

- Nothing has been done (to the working group's knowledge) to study the implications of global warming on B. C. Hydro's resource plan.

(ii) Actions

- Study the issue.
- Provide incentives for research within Hydro, universities and the private sector.

(e) Social Costs. How Can We Put Monetary Values on Environmental Costs?

(i) Considerations

- Government involvement is based on a political agenda. There are no methods or approaches available to adequately incorporate environmental costs into planning.

(ii) Actions

- Develop better methods to evaluate social costs during planning.

(f) There is no Well Thought-Out Link Between the Regulatory and Energy Planning Process in B. C.

(i) Considerations

- Apparently there is no link between the regulatory process and energy planning in B. C. Regulations do not seem to be enforced uniformly by government agencies.

(ii) Actions

- Establish credible enforcement of environmental regulations. Energy planning must be independent to gather the information necessary.

(g) Sustainable Development is an Exciting New Concept with No Clear Strategy for Implementation

(i) Considerations

- There is no method of incorporating the total scope of sustainable development on environmental and economic issues in resource planning.

(ii) Actions

- B. C. Hydro and the B. C. government should establish a sustainable development commission to coordinate input in the production of resource plans.

## (h) Current Average-Cost Pricing Encourages Wasteful Use of Energy

### (i) Considerations

- Favourable pricing structure is used as a mechanism to attract industry to B. C.

### (ii) Actions

- There is a need to ensure energy pricing is revenue-neutral and encourages conservation.

## (i) A Strategy of Conservation is Difficult to Administer and Harder to Control Than Conventional Energy Generation

### (i) Considerations

- Inadequate resources are available to communicate the importance of energy conservation.

### (ii) Actions

- Schools should have conservation as part of their curriculum.

- Information centres should be set up in local Hydro offices.

- Help people to understand the link between the light switch and the environment.

- Establish energy cost indicators of relevance to industry and the public.

### (iii) Considerations

- Costs to user to install new technology is very high.

- New produces are not readily available at the retail level.

### (iv) Actions

- Hydro and government should provide financial incentives to encourage early adoption of new technology.

### (v) Considerations

- There are insufficient R&D funds being spent on conservation technology.

(vi) Actions

- Increase funds available for R&D in conservation technologies.

## (j) General Concern that Independent Power Producers (IPP) May Cut Corners and Neglect Environmental Issues

What are cumulative impacts of many small hydro projects relative to a single major project?

## (k) Communication and Education of Public for Acceptance and Involvement

(i) Considerations

- B. C. Hydro has traditionally not communicated their policies and intentions.
- B. C. Hydro has to be more sensitive to public interests.

(ii) Actions

- B. C. Hydro should put more effort into public relations and open communication (e.g. more cooperation; more forums) of resource and project planning.

## (l) Lack of Information on the Characteristics, Costs, Feasibility, and Environmental Impacts of Alternate Resources

(i) Considerations

- B. C. Hydro has historically been a large hydroelectric project builder and changing the organizational thinking towards alternate resources appears to be a difficult adjustment.
- Some alternatives are perceived to be very costly and are quickly dismissed.

(ii) Actions

- B. C. Hydro should put more time and money into research and development on alternative energy resources.
- Conduct research to determine feasibility and economic costs and benefits.

### (m) There is No Clarity on How Hydro Interacts with the Public and Private Sector

(i) Considerations

- In the past, an adversarial relationship has developed between B. C. Hydro and environmentalists and regulatory agencies.

(ii) Actions

- Change the way in which Hydro interacts with the public to one that is co-operative and pro-active.
- Hold meetings with selected publics on specific aspects of alternate sources (e.g. solar, wind, IPP).

(iii) Summary

A. Overview

Alternate resources cover a broad range of energy sources from solar and wind through conservation to cogeneration projects. Discussion within the various roundtables addressed the following questions:

1. How can cogeneration be made a reality?
2. How can we increase our efforts to conserve electricity?
3. How can we better incorporate alternate resources in B. C. Hydro's resource planning?
4. How can we develop a dialogue between the public and B. C. Hydro to educate both Hydro and the public about environmental and resource planning issues?

B. General Recommendations

1. Overcome lack of understanding, uncertainty, and bias through research and development. Feed the research and development results into resource planning.
2. Foster two-way communication with 1) regional forums and education programs; and 2) resource specific (e.g. demand side management) with smaller more focused groups.

3. Provide incentives for conservation through:

- legislation;
- enforcement of environmental regulations;
- financial incentives for new technology;
- marginal cost pricing;
- better marketing and packaging of conservation programs.

## 3.6 WORKSHOP #6: ALTERNATE RESOURCES PROJECT PLANNING

### Issues

The varied comments from the participants in this workshop have been synthesized into three main issues:

1. The commitment to demand-side compared to supply-side management, specifically in terms of:
   - the role of energy conservation; and
   - the demonstration of the need for more energy.
2. The commitment to implementing alternative energies.
3. The relationship between the environment and the economy.

Each issue is presented in turn, along with the barriers and recommended actions related to it. In some cases, actions are recommended without identifying specific implementing parties as reflected in each table's notes. The issues, barriers and actions have not been prioritized. Facilitator's comments added to the text cover items not mentioned in the notes taken at each table. Additional facilitator comments are found at the end of this workshop report.

### (a) Commitment to Demand-Side Compared to Supply-Side Management

Subissue 1: the role of energy conservation.

#### (i) Considerations

- The alternative energies workshop was devoted to both demand and supply-side aspects of the equation (i.e. conservation and alternative energy sources). At least one group of participants felt that conservation deserved greater prominence.

#### (ii) Actions

To give energy conservation top priority in both energy planning and actual energy use, the following actions were proposed.

- In its energy scenarios and overall energy planning, B. C. Hydro put conservation as its top priority, ahead of all supply-side management initiatives (i.e. all energy projects including alternative energy ones). Specifically, B. C. Hydro should implement "Power Smart 2" now and put money into energy conservation rather than into new projects.

- The provincial government should mandate energy efficiency through energy conservation legislation (e.g. energy-efficient requirements for new housing).

  Facilitator's Note: The implicit assumption is that conservation will be shown to be comparatively inexpensive.

- B. C. Hydro should adopt costing practices that favour energy conservation. The price of energy should be structured to encourage conservation, for example, by making subsequent blocks of energy at least as expensive as the first. (Currently the rate structure encourages increased energy use since subsequent blocks of energy are progressively cheaper).

  Facilitator's Note: All participants at the table making this proposal were opposed to a rise in the unit price of electricity.

- B. C. Hydro and consumers should initiate action to ensure that there has been a fair assessment of all the costs involved for each energy source and project.

  Facilitator's Note: The actions proposed above imply that, unlike the maintenance and development of energy sources, energy conservation is environmentally safe and thus deserves to be treated more seriously.

### (iii) Considerations

- Public perception. The public thinks that our energy supply is endless so people don't implement conservation actions even though they voice an interest in energy conservation. The idea that the supply is endless stems from a lack of understanding about: a) the relationship between energy supply, demand, generation and conservation, b) the basis of export sales (which are seen as evidence that we have energy left over), and c) B. C. Hydro's dividend payment to the provincial government (which is seen as evidence that Hydro is making money and that there is no need to conserve).

(iv) Actions

- Provide adequate public information and education about energy demand, generation, supply and conservation. This requires increased funding and the identification of Hydro "champions" (i.e. people dedicated to interacting with the public and creating this awareness and understanding).
- The provincial government should undertake to review the provincial energy policy and then inform the public of the reasons behind the export and dividend policies and their relationship to energy supply, demand and conservation.

(v) Considerations

- Public behaviour. People's expectations about their standard of living and desired lifestyles are at odds with adoption of energy conservation.

(vi) Actions

- Fund social science research on modification of lifestyles to direct people to more sustainable models.

(vii) Considerations

- There is no direct relationship between what the public voices as its concern and how decisions get made. There is interference from lobby groups and decision-making is fragmented.

(viii) Actions

- Hold more public forums.
- Set up a broadly-based task force or steering committee on energy issues with representatives knowledgeable on public expectations and communications.

(ix) Considerations

- Other related barriers are caused by the interference of lobby groups and public apathy.

(x) Actions

- No actions dealing with the above barriers were proposed.

Subissue 2: there is a need for acceptable demonstration of the requirement for more energy so that no unnecessary projects are constructed.

(xi) Considerations

- Energy forecasts are uncertain and can lack credibility, especially when special interest groups provide different forecasts.

(xii) Actions

- To increase the likelihood of matching forecasted need with energy supply, B. C. Hydro should use an iterative process (to ensure that forecasts are updated regularly, rather than being cast in stone), and improve its forecasting methods.
- To improve the confidence in the forecast, B. C. Hydro should have its annual forecasts evaluated or verified by consensus (i.e. having B. C. Hydro and/or regulatory agencies request consultants and special interest groups to verify or validate the forecast).

(xiii) Considerations

- Climate change may cause a mass migration of people to B. C. resulting in an increased energy demand even if all conservation measures are adopted.

(xix) Actions

- None proposed.

Facilitator's Note: Implies a need to look at the supply side of energy regardless of the prominence of conservation.

(b) Commitment to Implementing Alternative Energy Resources. Are Alternative Energies a Real Part of the B. C. Energy Scene?

(i) Considerations

- If yes, then the barriers against their implementation need to be addressed. The energy market works against innovation, i.e. alternative energies. Alternative energies are relatively new. As such we lack knowledge about them, they are more risky (in terms of starting them as business ventures) than other energy sources, they cost more, and we lack experience with them.

### (ii) Actions

- To strengthen the practicality of alternative energies, the following actions were proposed:
- Develop accessible, quality information on alternative energy.
- Establish a library or resource centre on the subject.
- Promote and fund a university chair on alternative energy.
- Establish and fund an alternative energy research institute.
- Establish a large prize for innovations in alternative energy and solicit submissions internationally.
- Hold an international conference (on a regular basis) on alternative energy sources.
- Develop an economic climate conducive to high risk ventures so that we can successfully initiate alternative energy projects, the following actions were proposed:
- Undertake research and development in alternative energy sources, so that the development of business opportunities in this area can be enhanced. Specifically, the provincial government should establish alternative energy as a priority research and development area, as is the current practice with software, electronics, sub-sea technology and value-added wood projects. Tax concessions and reduction of bureaucratic requirements were also proposed to reduce financial risk. (Right now there are higher capital costs and longer term payback in an economic environment where the emphasis is on short-term benefits).
- B. C. Hydro should include more wide-ranging backgrounds in the membership on their Board of Directors (e.g. environmentalists) so that the corporate mindset is conducive to perceived high risk ventures, such as alternative energy projects. The resulting more broadly-based perception of risk would have a greater likelihood of accepting the use of alternative energies.
- Reduce the bias against energy conservation and alternative sources of energy by incorporating environmental and social costs in technology evaluation and implementation.

- Implement true cost accounting (including marginal, environmental and social costs) in evaluating all projects and energy sources. Similarly, consumers and B. C. Hydro initiate action to ensure that there has been a fair assessment of all the costs involved for each energy source and project.

- Implement marginal-costs load pricing so that the cost of energy reflects the true or actual costs involved in producing energy from a specific source.

- Recognize the difficulties in environmental and social costing and establish a task force (including external bodies like universities and interest groups) to look into the matter. Modelling programs and the involvement of local community (i.e. site-specific) concerns should be included. (This kind of public involvement is likely to influence B. C. Hydro's energy scenarios and project and planning priorities).

- Infrastructure. Like any energy source, alternative energy projects need an overall infrastructure in place to ensure their success. This includes associated services, maintenance, parts supply, and expertise.

- Reliability. More research and development and provision of overall infrastructure.

- Certainty. Address the topics of how much power can be produced by alternative sources, and at what cost, so we know how much we can count on such projects in resource planning.

### (c) The Relationship Between the Environment and the Economy

Is Hydro's position environment versus economy or environment and economy, i.e. sustainable development? Some of the groups discussed the concept of sustainable development and the environmentally friendly economy. This discussion was fundamental to the other issues raised about alternative energy sources, because the implicit basis for advocating conservation and alternative energy sources relates to the preservation of the environment. However, some participants noted that because measures like marginal cost pricing have potentially negative impacts on economic growth, the real question is: Does Hydro need to pay more for alternative energy?

#### (i) Considerations

- Several barriers to effectively transform the economy to the sustainable development model were mentioned including current economic policy, pricing structure, lack of public information, and institutional fragmentation.

(ii) Actions

Assuming that the traditional growth economy is transformed toward the concept of sustainable development, barriers related to policy, pricing, etc., would need to be changed as follows:

- The government should change its economic policy from one which is growth-oriented, i.e. based on a resource economy, to a more diversified, energy efficient one, i.e. a sustainable one.
- In the context of such a policy, the public, B. C. Hydro, and the government should develop a consensus about the direction to take when energy alternatives are not available, especially on a site-specific basis, i.e. what happens when there is no other desirable option? Switch from the idea that economic growth and environmental protection are inherently incompatible to one that recognizes the primary value of a sustainable environment. Specifically, adopt a policy that if a project or technology is environmentally unacceptable it cannot be implemented.
- The energy pricing structure should be changed to encourage energy conservation and to maximize energy efficiency by:
  - making the trailing rate for energy use higher than first block of energy;
  - initially making the change from one energy source to another revenue neutral, so no one is economically punished for using an alternative energy and/or more environmentally acceptable source.
- The need for wise energy use should be addressed by B. C. Hydro, the government and others providing the resources to develop a public education and information program whose objective is to develop informed, wise energy users.
- The current fragmentation of environmental and economic concerns as reflected in institutional structures (e.g. different government departments handling each of these aspects rather than consolidating them) should be addressed as soon as possible.

- Energy planning and forecasting timeframes should be lengthened so that long-range as well as short-term impacts can be addressed. The current timeframe (quarterly or annually, based on short-term profits) is usually at the expense of the environment.

- To protect the environment:

  - Funds should be allocated to environmental priorities. Specifically the government and the B. C. Utilities Commission should add a small energy surcharge to electricity to pay for the cost of mitigation, conservation, or selection of an environmentally better but more expensive energy alternatives.

  - More studies of environmental impact of site-specific projects should be undertaken by industry and lobby groups to result in better-informed decisions and protection of the environment.

  - The government and B. C. Hydro should undertake demonstration projects that are requested by the public and lobby groups.

- All aspects of evaluating different energy sources be made comparable to facilitate comparing all associated costs for each energy source.

  Facilitator's Note: All actions pertaining to 3.6(a) and 3.6(b) also apply.

(iii) Other Information Brought Forward

- There are long-term benefits of developing more environmentally friendly sources of energy: a) more flexibility to slot in small projects between large ones, i.e. developing a power mix rather than a single power source, b) development of consulting expertise (e.g. in small hydro and wood waste) that can be exported.

- There is a need to take seasonal applications and site-specific requirements into account.

- A commitment to overcome organizational inertia and for broad-based involvement in energy decision-making is needed.

- There is a need to reflect public information and knowledge.

Facilitator's Note: There were differences of opinion about who was most knowledgeable, the experts, B. C. Hydro, the government, the general public, etc., with each side putting forth recommendations about how the other should be better informed, as follows:

- Politicians should keep environmental issues up front after an election, rather than just using them as part of a platform to get elected.

- Media should keep ongoing, prominent coverage of environmental issues rather than sporadic, crisis-oriented coverage.

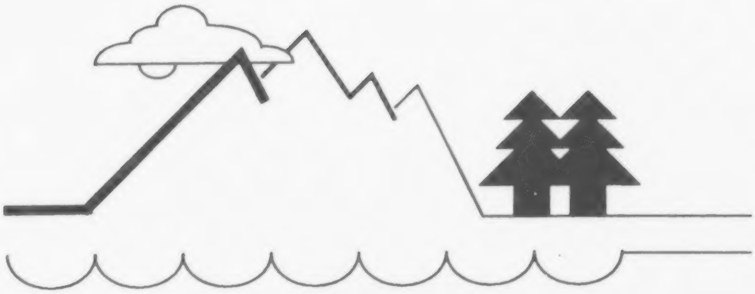
- Energy questionnaires should ask questions which force values out rather than just asking if people are willing to spend more on energy conservation (since everyone has a different opinion about how much more money is).

- The government should change its legislation to add more requirements about what constitutes an announcement of public consultation at the beginning of an energy project.

# ELECTRIC ENERGY

## FORUM

## Energy and the Environment



## LUNCHEON SPEAKER

# B.C.'s Policy for Environmental Protection

The Honourable Bruce Strachan

Minister of the Environment

and

Minister of the State for Cariboo

Province of British Columbia

# ELECTRIC ENERGY FORM
FRIDAY 12 MAY 1989
LUNCHEON ADDRESS BY THE HONOURABLE BRUCE STRACHAN
MINISTER OF THE ENVIRONMENT
PROVINCE OF BRITISH COLUMBIA

Mr. Don Swoboda:

The Director of Environment for B. C. Hydro, Dr. Lorne March, will introduce our luncheon speaker.

Dr. Lorne March:

Thank you Don and good afternoon everyone. It is my special pleasure today to introduce our luncheon speaker, B. C.'s Minister of the Environment and Minister of State for the Cariboo; the Honourable Bruce Strachan.

Mr. Strachan graduated in Arts and Sciences from the College of New Caledonia in 1973. He was elected to the Prince George Board of School of Trustees in 1976 and served as a board member and the Chairman until he was elected to the Legislative Assembly in 1979. As a point of interest, as of last Wednesday, on May 10th, he has represented the Prince George South riding for 10 years. He is currently Chairman of the Environment and Land Use Committee of Cabinet as well as a member of the Cabinet Committees on Regional Development, Legislation and Regulation and Native Affairs. Now I know he is an extremely busy person, because I have attended a number of environmental-related seminars and conferences around the province; and whenever I have gone to these, Mr. Strachan is always one of the keynote speakers. So I think he must be on permanent travel status. In this regard, with the legislature in session, we are both fortunate and privileged to have him take time out from a busy schedule to talk to us today. His subject is, "B. C.'s POLICIES FOR ENVIRONMENTAL PROTECTION". Ladies and Gentlemen, would please join me in welcoming the Honourable Bruce Strachan.

MINISTRY OF ENVIRONMENT

SPEECH
# "B.C.'S POLICIES FOR ENVIRONMENTAL PROTECTION"

SPEAKING NOTES FOR
THE HONOURABLE BRUCE STRACHAN
MINISTER OF STATE FOR CARIBOO
RESPONSIBLE FOR ENVIRONMENT

TO THE
B.C. HYDRO FORUM ON ENERGY AND THE ENVIRONMENT
VANCOUVER, B.C.
MAY 12, 1989

Ladies and gentlemen.

Thank you for asking me to join you today.

This Forum is especially important and timely, because of the profound environmental impacts of energy use in today's world.

We are witnessing with increasing alarm the warming of our planet due, at least in part, to carbon dioxide from the combustion of coal, oil and gas.

Tankers ply our coasts, carrying oil to heat and light our homes, run our cars and transportation systems, and supply our industries.

There are nearly 200 million automobiles in Canada and the U.S., but just one litre of gasoline from a leaking underground storage tank can make one million liters of groundwater unfit for human consumption.

Manufacturing and processing industries use more than 100,000 chemical substances, with over 1000 new ones added every year.

And the environmental price can be high:

- Burning of fossil fuels is altering our atmosphere and climate.
- Transportation, leakage, or spillage of those fuels is putting fish, wildlife, and natural habitat at risk.
- Chemicals are affecting the air we breathe, the water we drink, and the soil we grow our crops in.

Media attention has sharply increased public awareness of the dangers associated with modern energy use.

Through television, British Columbians have seen wildlife and seabirds struggling for survival in the aftermath of the Valdez and Grays Harbor oil spills.

Every day, they read newspaper reports of global warming, dioxins, acid rain, PCBs, CFCs, pollution, and contamination.

As a result, in boardrooms, living rooms, and at the cabinet table, we are more aware than ever of the fragility and vulnerability of the environment.

More concerned than ever about our ability to sustain it.

And more committed than ever to a dramatic change in the way we do business.

In short, environment is at the top of the public agenda, and its sustainability is now the guiding principle of development and resource management in British Columbia.

In my view, sustainability depends on developing strategies and initiatives to "anticipate and prevent", not "react and repair".

To help develop a strategy for sustainability through anticipation and prevention, in January we appointed a special Task Force on Environment and Economy.

The Task Force, chaired by UBC President Dr. David Strangway, has the job of strengthening the links between environmental and economic objectives in all aspects of resource management, including energy generation and use.

Made up of representatives from industry, government, labour, native and environmental organizations, it will make recommendations in several vital areas by early summer. These include:

- Creating a permanent Forum of public and private sector decision makers to advise on the integration of environmental management and economic development;
- Developing a provincial conservation strategy aimed at long term environmental protection and effective resource use; and
- Promoting understanding of the bond between the environment and economy through environmental education.

The work of the Task Force will give us the policy framework for anticipation and prevention over the medium-to-long term.

But there must also be direct action to address current public concerns about the quality of our environment.

We need to reduce pollution, contamination and other threats to public health and environmental safety.

The Ministry of Environment has taken a number of steps to give a clear signal that those kinds of serious environmental and health impacts will not be tolerated.

We have new, province-wide standard which limits the sulphur content in industrial fuels to 1.1 percent.

This is the toughest regulation of its kind of Canada, significantly lower than the levels allowed in the east. As a result, there will be a significant improvement in air quality, especially for those communities in the southwest vulnerable to acid rain.

In addition to setting province-wide standards, we're moving to reduce pollution at source, by intensifying monitoring and enforcement, and by creating timetables for improvements.

During the past winter, all pulp mills using the chlorine bleaching process were required to submit dioxin reduction plans to my Ministry for review and evaluation.

In cooperation with the federal government, we will ensure that these plans go into effect during the coming year.

Similar action is being taken on the use of anti-sapstain chemicals and other preservatives used for lumber treatment.

In my own community of Prince George, the Ministry's waste management staff and local industries are negotiating a schedule for reduction of the excessively high air emissions.

In Williams Lake, a serious air quality problem caused by poorly maintained or outmoded woodwaste burners is being solved through an upgrading program at each of the local sawmills, also in accordance with Ministry deadlines.

For the longer term, we're looking at ways to use these wastes to co-generate electricity.

We are developing regulations on the use of chlorofluorocarbons, or CFCs, so that our province can make its contribution to minimizing the effects of these substances on the Earth's protective ozone layer.

Through the Ministry of Energy, Mines and Petroleum Resources, new funding is being supplies for mine inspection, mine drainage cleanup, and projects to extract energy from mineral and woodwaste products.

The cleanup of contaminated PCB sites in British Columbia is another example of the need to anticipate and prevent, rather than react and repair.

Once used freely in the generation of electrical energy, PCBs are now a legacy that presents serious risks.

For this reason, Ministry staff are assessing the environmental impact of PCBs, increasing awareness through publications, fact sheets, and other material, and identifying storage sites and the extent of any contamination.

In fact, we have taken an inventory of all PCB storage sites in the province, and a Ministry inspection team is checking for safety and security.

Once that assessment is completed, we will require PCBs now stored in schools, hospitals, and other sensitive areas be removed for secure storage elsewhere.

And we will insist on proper cleanup and containment, soil testing and reclamation at any other sites where there are signs of leakage.

The PCBs at these sites emphasize the importance of moving as quickly as we can to establish our waste management system for these chemicals. Proper disposal would end the risks associated with continued storage and possible contamination.

The oil spills in Grays Harbor and Prince William Sound made it clear that stronger coastal environmental protection measures are also urgently needed.

That's why the governments of British Columbia, Alaska, Oregon, and Washington have established an Oil Spill Task Force to review shipping safety and emergency response procedures.

From my perspective as British Columbia's Minister of Environment, the Task Force needs to apply the "anticipate and prevent" principle in a number of areas.

These include:

- Reviewing the regulatory requirements governing the operational and structural safety of oil tankers and barges;
- Examining the adequacy of procedures for reporting and monitoring environmental emergencies;
- Looking at ways to reduce response times and improve methods of mobilizing manpower and equipment; and
- Streamlining the mechanisms for determining liability and handling compensation claims.

The challenge facing this Task Force is to anticipate and prevent in working to establish procedures for dealing effectively with environmental emergencies.

In that way, it will make a sizeable contribution to preventing the recurrence of the recent spills, or at the very least, ensuring they cause a minimum of environmental damage or disruption.

The development of an anticipate and prevent management policy and the implementation of anticipate and prevent protection initiatives are a good start.

But more is required to ensure our environment can meet the needs of today and the demands of tomorrow.

We must redouble efforts to reduce dependence on fossil fuels.

Energy conservation must be encouraged wherever possible.

And we need to look closely at energy efficient technologies -- for everything from industrial applications to household appliances.

My message today is that we all share responsibility for environmental sustainability:

- Industry for reducing pollution, discharges, and for developing cleaner technologies.
- Government for tougher regulations and enforcement; and effective monitoring, protection, and response procedures.
- And all of us for creating a marketplace that increases the use of environmentally sensitive products and reduces inefficiency and waste.

By sharing responsibility in this manner, we can be sure future demand on our energy and other resources will not outstrip supply.

We can be sure of development without environmental risk.

We can be sure of sustainability.

Thank you.

Mr. Don Swoboda:

We have maybe five minutes. The Minister has agreed to respond to a few questions. We are not set up with a floor microphone, but if somebody has a voice that will carry, we will try it for about 5 minutes.

For those of you who did not hear the first question, it was, "Will we be introducing legislation for a permanent moratorium on oil exploration in the Straits of Georgia?"

Mr. Strachan:

I presume, that you mean all offshore oil exploration; not just in the Straits of Georgia. At this point, we have introduced a 5-year moratorium. I do not anticipate adding many more years to that. Not that there will not be a further moratorium introduced after five years; but there is not much point in one government, and I am probably not going to be here forever myself, introducing a moratorium that is forever, because that can always be changed by another government. We have said there will be a 5-year moratorium on any offshore exploration at this point; and I am sure that when those five years are up, subsequent governments will have to think about what they are going to do. I do not think it would be productive at this point for me to put in place any moratorium with much more than a 5-year term.

Unidentified questionner:

"Was the offshore exploration legislated?"

Mr. Strachan:

I guess to an extend it is. In a sense it would take considerable agreement and protocol and consultation by the federal and provincial governments before any activity could take place. So by simply saying that we will not come to the table for five years, and by maintaining that position; you can be assure that the moratorium is in place and has a strength of legislation behind it.

Unidentified questionner:

"Have we been looking at alternatives to incineration for toxic waste management?"

Mr. Strachan:

There are two ways of dealing of toxic wastes. One is incineration. We know, from the best advice we can get, that in dealing for example with PCBs; that high-temperature incineration is the appropriate method of complete destruction.

Other toxic elements take further work and so there are other methods. But in terms of eliminating or telling ourselves we can deal with toxic wastes, and not use incineration; I am advised that it cannot happen. For many destructive purposes, you do need high-temperature incineration, and that is the only way that you can handle the product now. B. C. Hydro does do some chemical destruction of PCBs but that only works at relatively low levels of contaminated oil. If you are dealing with high-level contamination then you have to consider high-temperature incineration. It is the only remedy known to us now.

Mr. Don Swoboda:

I think we will have to cut it off there, ladies and gentlemen, view of the time. We want to get on to the afternoon program and to keep ourselves on time. I would like to call upon Pat Walsh, a Director of B. C. Hydro, and also Mayor of Fort St. John, to thank our speaker. Mr. Walsh.

Pat Walsh:

Thank you very much Don, and thanks for the opportunity to thank Bruce for addressing us today. Bruce and I go back a long ways. I recall the School Board days in Prince George. He and I got to know each other very well then. Bruce has always been a great supporter of northern British Columbia, where we share mutual interests and difficulties. But you know, Bruce, in the two years that you have been Minister responsible for the environment; you have certainly showed to all of us a real keen solid interest, in not just the north but of all British Columbia. The speech that he has just delivered to us is an example of those things that his Ministry is addressing. I think it is a most impressive one, and one for which we must thank him. Bruce, thank you very kindly for being with us; thanks to your Ministry for joining with Hydro in hosting this very fruitful meeting, and thank you for being interested enough in our deliberations to agree to respond to questions. Thank you, Bruce.

Mr. Don Swoboda:

That concludes the luncheon program, we will convene in 10 minutes in the meeting room next door.

# ELECTRIC ENERGY
FORUM

## Energy and the Environment

## SESSION V: UPDATE AND FORUM WINDUP

# SECTION 9

## SECOND ANNUAL ELECTRIC ENERGY FORUM

## "ENERGY AND THE ENVIRONMENT"

FRIDAY 12 MAY 1989
1:30 P.M. - 5:00 P.M.

## SESSION 4: UPDATE AND FORUM WINDUP

* "POWER SMART (DSM) UPDATE" - MR. BOB CROCKETT
MANAGER OF MARKETING - B. C. HYDRO

QUESTIONS DIRECTED TO MR. CROCKETT

* "INDEPENDENT POWER PRODUCER UPDATE" - MR. WAYNE MORGAN
MANAGER OF POWER CONTRACTS - B. C. HYDRO

QUESTIONS DIRECTED TO MR. MORGAN

* "ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT"
DR. DONALD CHANT, CHAIRMAN AND PRESIDENT
ONTARIO WASTE MANAGEMENT CORPORATION

QUESTIONS DIRECTED TO DR. CHANT

* "CLOSING REMARKS" - MR. LARRY BELL, CHAIRMAN, B. C. HYDRO

# Power Smart (DSM) Update

**Bob Crockett**

**Manager of Marketing**

**B.C.Hydro**

## Introduction of Mr. Bob Crockett by Conference Chairman Don Swoboda:

I would like to welcome and introduce a colleague of mine, Bob Crockett, Manager of Marketing at B. C. Hydro. Bob is one of our new recruits, having joined us in 1988. He graduated in Economics from the University of Alberta in 1976, and since then has held various production and marketing positions with Proctor and Gamble, International Playtex, and Nabob Foods. You might ask what those backgrounds have to do with the Power business? I think you will find in the enlightened marketing strategies and the initiatives that Bob has shown in marketing at B. C. Hydro, that he brings a great deal of experience and initiative to the programs that we touched on a year ago. In particular, he is involved in those which we called demand-side management last year and now call Power Smart. He will provide us with an update on our Power Smart Program for 1989, Bob Crockett.

# POWER SMART (DSM) UPDATE

MR. BOB CROCKETT

MANAGER, MARKETING, B. C. HYDRO

Good afternoon, ladies and gentlemen. Now, the job of the person who speaks after lunch is to keep the audience awake for the more interesting speakers who come later in the afternoon. My topic is energy conservation. For those of you who want to get some sleep I will tell you what I am going to talk about and then I will make sure that you are awake at the end of the show. There are two things that you will miss if you sleep at this point. The first thing is that the marketing of conservation will be one of the most exciting marketing activities in British Columbia in the 1990's. The second thing that you will miss is that B. C. Hydro has some of the most innovative programs of any utility in North America and you will wish other people were doing the same. For the rest of you, I am going to talk very fast, so you are going to have to listen very carefully. I want to talk a bit about why I think this is such an interesting area, what are the tools that we have to work with and what the heck is B. C. Hydro going to do about it?

Last year when we introduced it, we talked about a plan called DSM or demand-side management (Exhibit 9-1). This is a very interesting term that could have all sorts of strange meanings. We promised last year that we would come back to this Forum and tell you more about it. DSM is based on the very exciting concept that allows conservation to compete with other forms of supplying electricity to meet the future electrical demands of the province. Essentially, a kW saved is a kW earned. It is interesting to this group because conservation is one of the most environmentally benign options that we have available to us to provide electric power. In the United States, up to 60 percent of the SO2 emissions are from coal-fired thermal plants. Therefore, demand-side management is clearly tied to the environmental issue. I want to talk about one particular part of DSM today and that is our ultimate target of an energy saving of 2300 GW.h per year through conservation. This is an estimate. It is not really a target. We are certainly going to go for as much economic conservation as we can possibly get from the system. The question comes up all the time, "Why are we only going for that much?" We know that the technical potential is about four times that. There is a technical potential which is defined by doing absolutely everything with the best technology available. However, there are other criteria placed on it.

A second criterion is, "What is the economic potential?" How much are customers willing to pay for DSM? Everything has its price.

The third criterion, which is really hard to understand, is the marketing potential, and that is essentially the reality check. What happens in the market place? It comes down to a very basic issue of behaviour versus attitudes. We are looking for a change in the behaviour of people, a change in how they consume electricity. Often attitudes and behaviours can differ from what we expect. Let me give you this one example, the Grocery Product Management Association of Canada surveyed people, and 80 percent of the people said they were definitely or somewhat willing to pay more for environmentally safe products (Exhibit 9-2). Who could say no to that? A short time later in the survey they came up with another question where they asked, "Would you look for recyclable, biodegradable packaging on a household product?" Willingness dropped to 36 percent and for the same question on a food product, down to 33 percent. You have to ask yourself, "Why is it that people will say one thing and do another?"

In fact, the theme of my presentation can be summarized in this phrase: "It is one thing to awaken and yet another to actually get out of bed" (Exhibit 9-3). It is tough when you think very logically yourself, "Why is it that the people do not do things even when it is obvious?" I heard that from many utilities in the United States last week. It boggled their minds. It was not going to cost their customers a thing; the utility was going to pay for everything, the payback was there, everything was there, and yet their customers were still not initiating DSM programs.

We have our own example. Last year in the Queen Charlotte Islands we played a little game with some people in terms of testing compact fluorescent light bulbs. We said we are going to take it one step more. We already knew that the payback is there. We gave these customers one efficient light bulb free and allowed them to buy a second for five dollars. This would give them some real experience and then logic would take over and life would be fine. Well, one year later we went back to those people and the take-up was fantastic; 90 percent of the people who took the free bulb also went out and bought one for five dollars. They used it and we phoned them. They said, "Yep, we are still using them, they work just fine." We said, "Great, how would you like to buy one for 20 dollars?" The answer was only two percent said yes, even when we gave people the experience with it, they liked it and they were still not ready to take that next step. I think it is very important to understand this.

If conservation was as easy to implement as everybody in this room would like it to be, we would have an easy marketing job. But what does the average British Columbian want today? As much as ever, the average British Columbian is looking for a home that they can buy. In addition to the car, they want to fill the home up with all those nice things that make their life wonderfully comfortable and safe. Most of these things consume energy.

The group out there, those ordinary people in this province are a bit different from this group. On average, they do not have much more than a grade 11 or grade 12 education. I suspect this room can beat that average and because education is often tied to income, this group has above average income and, unlike the rest of the folks out there, we only watch television when there is a PBS or National Geographic Special. Whereas, on average, the people out there watch over 20 hours a week. All those other people out there, 30 percent of people in Vancouver, do not read a daily newspaper. I go back to that government study last year; there are five million illiterate adults in Canada, which means if we have our fair share, we have half a million people who cannot read a bus schedule. That is the real world, that is what real people are like, but the point is not that I am trying to describe Joe average citizen. In fact, Joe average citizen does not exist and, as you know, if you take it to the extreme, the average British Columbian citizen has one breast, one testicle, and half a child. Not even the West End of Vancouver can produce many of those! But rather, the population is quite diverse, and many of the preconceptions that we have, do not exist. Fifty percent of households today are one or two persons. In fact, that picture perfect family of the mom and the dad and the two kids eating breakfast, having their cornflakes, represents less than 20 percent of households in B. C. today. Many people out there have attitudes which differ from those in this room. That is what makes marketing so exciting.

There is a second thing we have to examine. These people are human and they are not logical. I will give you this description; we hear with our ears, but in fact we listen with our head, our heart, and our guts (Exhibit 9-4). Our head gives us the logical answers, our heart is what I call the "me emotions": love, hate, greed and fear, which cover most of our reasons for doing things. Our gut gives us our traditions or customs. For example, if I asked you, "How do you do?" You do not try to make sense of that. You know that it means I am asking "how are you doing today?" If I ask you, "what do you do?" Your brain answers, "this is what I do." But if I tell you what to do, chances are your heart will respond. But there are people in the advertising business who will tell you that, if you are having an argument with yourself between your emotions and logic; emotion wins every time. If you think about the house that you may have bought, you probably bought it on emotion and then you asked your brain to justify it to the banker.

We would like to believe that we are emotional people, based on our "me emotions" and our "we emotions." What does that say about all those people outside of this room? How are they living in today's world? In this wonderful world of media, we have confronted ordinary citizens with all of the world's problems. We watch it on television every night, most people now use the television as their main source of news and they get it in great gobs and heaps. People have different reactions to that. There are some people to whom the term 'crisis' just does not mean anything any more. You cannot impress them anymore because they have seen it all: drought, famine, and wars. They say give me something that I have not seen yet. The other thing is that some people just turn off. They have become selective as part of a defense, because they are being bombarded all the time with something like 3,000 commercial messages a day.

Demonstrate to yourself the quality of your selective perceptions. Put your hand over your watch. Don't look at it. Your watch is one of the most intimate pieces in your wardrobe. Some people say we look at our watch 300 times a day. If there is anything you should know well, it is your watch. I want to ask you this question, "Can you describe the face

of your watch for me?" Does it have Roman numerals? Does it have numbers all the way around? Or just numbers like one, nine, six? Chances are you are not quite sure, and you look at that watch 300 times a day. Now look at your watch just to see if you are right. Now having looked at your watch, cover it up again and tell me what time it was? We do it all the time; everybody does it. We piece together these things; that is the way we work.

So how are we going to get everybody to act collectively to conserve electricity? I think we have to do a couple of things; we have to involve all of thes principles. We have to involve logic and emotion. That is why we jump back and forth from the good life to the serious issues in our television commercial on Power Smart. I think we should try to avoid the shrill crisis call such as saying, "We have got to do this." That is why it is more effective for the average Joe to get excited about an oil spill when he sees an otter covered with oil than if you bombard him with statistics about how many millions of litres are spilled out there. The other thing is, we have to meet people's current expectations. People do want a good life and so we should make sure our message is not contradicting what they want to do. We note that it is always easier to ride a horse in the direction it is going.

Okay, so what are the tools that we have? We have basically four tools: regulations, incentives, ethics and habits (Exhibit 9-5). Regulations-"There ought to be a law." Incentives-"Let's pay those people to save electricity." The fact of the matter is, it is not an either/or thing, as you know if you have been in charge of affecting people's behaviour. If you have been a parent you know that affecting behaviour is a combination of rewarding good behaviour and punishing bad behaviour. A lot of people at B. C. Hydro are working actively to make sure that standards and various items are being increased to improve energy-efficiency. We also know that regulations and incentives only work if they do not apply to everybody and they make people stretch. If you simply reward everybody or punish everybody you do not get anywhere. The real key to long-term results is to use the tools of ethics and habits. You know you can affect short-term behaviour by either beating somebody up or paying them off. But you do not get long-term change until you have the person internalize it and accept it. Ethics is the way we do things around here and habits are what I call "no brain environmentalism." We want people to do it without even thinking about it.

So, what are we going to do about it anyway? I heard a great line at a recent conference in Ontario. Ontario Hydro is having the same kind of discussions as we are having today. At this conference someone got up and said, "You know, with all the alternative ways to produce power, to produce electricity these days, what we need is more Hydro from manure and not vice versa."

So we will have to cut out the vice versa and get on to what B. C. Hydro is going to do about all of this (Exhibit 9-6). The first things we have done are in-house. Mr. Bell referred to some of them the other day. We have changed all of the fluorescent lights to 34-watt tubes; we put in variable speed drives; we are changing incandescent light bulbs to more efficient screw-in bulbs. Outside and inside, any new B. C. Hydro building is going to be an example of energy efficiency. For example, by turning off the street-lighting load in the Revelstoke plant and switchyard during the day, we saved four million kW.h a year, enough to provide electricity for four hundred average homes. So far this year, our in-house program alone has saved 11.7 million kW.h.

We have worked and cleaned up our house a little bit and many of you have some of our public education campaign brochures in your registration kits. Certainly, the most feasible is the television "commercials" which talk about "Why" we are doing this and some of the "Hows." However, it is important that we give people the benefit of our expertise. We are the energy experts in B. C. and we can help people by appearing at trade or talk shows, giving "energy audits" and providing information, some of which you may have seen outside this room. We have launched a coloring contest with school kids. It is just a very simple program, but it is a start at communicating and building up the energy efficiency ethic among our children.

Water-heater jackets to wrap around electric water heaters will reduce the amount of lost heat. Last year we offered free installation. In some of the non-gas areas we installed 8,000 jackets. This year we plan to install another 21,000 water heater jackets in other selected areas. For those areas that do have gas in their service area, we are working together with the gas company who currently offer 100 dollars to convert from electric water heating to natural gas water heating and we will throw in another 50 dollars. For mobile homes we offer 30 dollars more for a total incentive of 180 dollars towards the cost of conversion. Here everyone wins, the gas companies are excited by getting the extra load, we are excited by getting rid of some of our load and the customer is better off because he gets a better water heater.

New home building standards called "Quality Plus" will be introduced this year. This is a set of standards that makes people stretch beyond the building code. We are developing a stylized "Q+" logo that will be placed new homes that are built to certain quality standards. When you build quality into a home today the plus is energy efficiency. The Home Builders' Association and the gas utilities are behind us in this program. If someone wants to build a quality home we can show them the options of heating with gas or electricity, but we do not want to be seen as promoting electric heat only. Here are the standards, and here is what makes it worthwhile for you in your area. For those who are interested, there are already some 'Quality Plus' homes being built. There is one under construction on Boundary Road, and some of the new developments in Westminster Quay are being built to 'Quality Plus' standards.

We have done a lot of research and testing on how to improve the efficiency of appliances. On one hand, we are working on the regulation side with Canadian Standards Association and on the other hand, we are trying to reward good behaviour by encouraging purchases of energy efficient appliances. There is an opportunity here to flip the market.

Lighting is 35 percent of the commercial electric load and last year we converted 100,000 standard four-foot 40 watt fluorescent tubes over to 34 watt fluorescents with nearly the same light output. This program will be expanded later this year. We are also testing better reflectors and new technologies that are available for commercial fluorescent lighting including electronic ballasts.

The program with the most experience is the industrial motor rebate for energy efficient motors. We have been promoting energy-efficient motors for a long time. We have been holding seminars on this subject for ten years. Even though motors comprise half of B. C. Hydro's electrical load, until recently energy-efficient motors were only about five percent of motors sold annually in B. C. So, we tossed in 400 dollars a kW. We built it up, so that the more efficient you get, the more money you get. All of sudden things are happening and it is quite exciting. Wholesalers are stocking the energy-efficient motors and people are buying them. Companies are demanding them, putting them in their standards. We feel we have built the sales of the more efficient-motors last year from 5 percent to about 20 percent of the market. I was talking to the people at General Electric last week and they told me that if we can get the sales up to 50 percent of the market, they will convert the whole line over. So the manufacturer will do the rest.

The item marked Exhibit 9-6 refers also to variable speed drives. Variable speed drives are very complicated, but they sell themselves, so we are out there making sure people are aware of them as an opportunity to save electricity for driving their motors.

I want to suggest to you that B. C. Hydro has come a long way and is doing a lot and is going to be doing a lot more. B. C. Hydro is not just involved, but is committed. You may know the difference between the two. It is best illustrated by bacon and eggs. To produce bacon and eggs you need a chicken and a pig. Well, the chicken is involved, but that pig, he is committed. B. C. Hydro is committed; we are in there. We have a ten year program of 225 million dollars. If the people of British Columbia jump on this and say, "Lets go"; we are going to take it a long way. We will be there every step of the way.

I think I would like to conclude by picking out a line from our Power Smart television commercial. I am sure Ken can recite it for you. In this commercial, someone asks him, "Can we do it?" As an illustration, at the pool that I take my family to on the weekend, the Canada Games Pool in New Westminster, they play this very neat game called the "whirlpool game". They get everyone in the pool to start going around

in a circle and soon that pool is just humming. Everyone is just coasting along, carried along by this whirlpool. Then the lifeguard blows the whistle and he says, "Okay everybody go the other way". There are great screams and shrieks and everyone is all excited and laughing. Then there is this wonderful moment when collectively all the people in the swimming pool realize that, yes, we can make the water go the other way because we are the people who made it go this way in the first place. So, I think the magic moment for Power Smart will come when collectively we all recognize that, yes, we can change the demand for electricity in this province, because in effect we were the ones that created it in the first place. So at this point, I will wake up the people who had a nice sleep, turn the lights back on and open up the podium for questions. Thank you.

Don Swoboda:

We have time for a few questions. First, "How does B. C. Hydro separate load growth from reduced load growth due to Power Smart in the immediate future and the far future?"

Bob Crockett:

I am not sure I understand the question, but I can certainly answer another one. The amount that we expect to save with Power Smart is about four percent of our annual demand. Power Smart is not the answer to everything, we do not believe that we can solve everything through conservation. But we do believe that we can help reduce the growing demand by making the people more efficient.

Don Swoboda:

Here is the second question: "If you are offering 50 dollars to convert from electric to gas water heat, why are you not also offering incentives to convert to gas space heating?"

Bob Crockett:

It is something we are examining. Usually when people are building a new home today it is fairly obvious which choice is the appropriate. If anyone called us today and said I am building a new home what should I use? If you have a gas supply, we would tell you to go gas. There are some people who actually prefer electric heat and I do not blame them. We leave it to the consumer. Converting from electric to gas is not as easy as it sounds because often the reason there is electric in the first place is the builder did not want to install the ducts, vents and other things and it is not always possible to just switch to gas. It is a little bit more complicated than just reinstalling, i.e. going from one type of water heater to another.

Don Swoboda:

"Utility Companies in the U. S. have programs to install generating equipment on customer's property to use waste heat. The customer operates the equipment. Is such a program viable in B. C.?"

Bob Crockett:

We are quite interested in the production of power through the recycling of waste heat which falls into our technical definition of co-generation. Although a specifically defined program is not in place we have opened our doors to discuss potential projects through a Request for Proposals. In general, we are interested in displacing existing load by helping customers install a co-generation system. The assistance might be as simple as technical information and we are willing to discuss financial assistance within limits. For Hydro to consider purchasing surplus power from that facility, we would look at the reliability and availability of the power. In summary, we are open to discuss such opportunities on a project-by-project basis for the moment.

Mr. Swoboda:

"If we look to 2040 and beyond we may have used up all our resources. Can we focus more on reducing demand from "Probable", to much lower? Should we double DSM dollars to achieve this?"

Bob Crockett:

I believe what we have established with Power Smart is an ongoing tool in our kit of options that is always a player in our resource plan. Power Smart can play as big a part as the people of B. C. demand, given there is a cost. It will also serve to alert the province to new technologies that will change the way we use electricity. These two factors make the Power Smart program flexible and responsive well into the next century.

Thanks to Bob Crockett by Conference Chairman Don Swoboda:

Bob, on behalf of the group here, I would like to extend our appreciation to you, for sharing an update on the demand-side management program, "Power Smart" in B. C. Hydro. It is easy to see with your stand-up delivery why Nabob Foods, Proctor and Gamble, and I have to speculate, Playtex International, were so successful in growing as business enterprises. I know that under your tutelage, with the challenge that you have in front of you, the move to Power Smart as a way of life will be successful and out of that process our consumers will be collectively equally successful. Thank you very much for your presentation this afternoon.

*Power Smart Programs*

# Demand Side Management Update

## "Power Smart"

POWER
SMART

Exhibit 9-1

*Power Smart Programs*

## SHOPPERS' ENVIRONMENTAL AWARENESS

| | |
|---|---|
| Definitely or somewhat willing to pay more for environmentally safe products | 80% |
| Would look for recyclable bio-degradable packaging on a household product | 36% |
| Would look for recyclable bio-degradable packaging on a food product | 33% |

From a survey of Canadian Shoppers
Source: Grocery Product Manufacturers of Canada

POWER SMART

Exhibit 9-2

*Power Smart Programs*

**It is one thing to awaken ...**

**Yet another to actually get out of bed**

POWER SMART

Exhibit 9-3

*Power Smart Programs*

**We hear with our ears but we listen with our ... head, heart and guts**

POWER
SMART

Exhibit 9-4

*Power Smart Programs*

# Finding the balance:

- Regulations
- Incentives
- Ethics
- Habits

POWER
SMART

Exhibit 9-5

*Power Smart Programs*

# B. C. Hydro Action

- In-House
- Public Education Campaign
- Water Heater Jackets
- Water Heater Conversion
- New Home Building Standards - Quality Plus
- Appliances
- Commercial Lighting
- Industrial Motors/Drives

POWER
SMART

Exhibit 9-6

## QUESTIONS FOR MR. BOB CROCKETT, ANSWERED AFTER THE FORUM

Question:

"Reduction of electrical energy use in the home with more efficient lighting, water heater jackets, etc., will increase energy required for space-heating; do you address this in your campaign?"

Question by: G. Keir

Mr. Crockett:

First, you are correct that a customer with electric space-heating will have to spend a little more on heating to offset the reduced heat losses of his efficient lamps, motors and waterheater insulation jackets. But not all customers have electric space-heating. So the residential kilowatt-hour savings we are promoting are, strictly speaking, only attainable in a non-electric heated home. However, for commercial buildings, more efficient lamps and motors means less air-conditioning load, and so the customer makes a double saving. The lamps use less electricity and the air-conditioner uses less electricity.

Question:

"What are you doing for existing buildings, as this is an even greater potential than new buildings?"

Mr. Crockett:

Well, we're going after the lights and motors in those buildings with our Power Smart Programs. But conversion to gas space heating is not so easy. An electrically-heated building requires extensive renovation to install hot air ducts or hot water piping. It costs more to switch to gas space-heating and so it takes longer for the switch to pay off. But we will encourage re-insulation and higher R-standards. That is clearly economic.

Question:

"Is the public credibility of the conservation program not damaged by the promotion of power exports?"

Mr. Crockett:

We are not promoting power exports. We have asked for expressions of interest from organizations interested in submitting proposals in new generation which could be exported for, say, 20 years. If they can market the power for a profit, then we will transmit the energy and charge our full costs. But that is a complicated issue tied to the Columbia River downstream benefits.

Question:

"If you are offering $50 to convert from electric to gas water heat, why aren't you also offering incentives to convert to gas space heat?"

Mr. Crockett:

We are looking at it. As I explained above, it costs a fair amount to add hot air ducts or hot water piping and registers to an existing building. So it takes longer to pay off the cost of the conversion with the money savings in monthly heating bills.

Question:

"Why aren't you providing incentives to convert to gas clothes dryers and gas stoves and ovens?"

Question by: Clive Walton

Mr. Crockett:

We have looked at this too. But there is a concern that with Quality Plus home standards, which use pretty air-tight construction, that using gas in stoves and ovens could cause an air quality problem. With natural gas combustion in stoves, ovens and even gas clothes driers, the gas uses up the oxygen and releases CO2 and water vapour into the home. So, there are no Power Smart incentives to switch your electric stove, oven or dryer at present.

Question:

"How does electric plus on Vancouver Island fit in with the drive for increased efficiency?"

Question by: G. Alexander

Mr. Crockett:

They are two different programs with different purposes. Electric Plus is a special rate for interruptible power for space heating. It comes from surplus "secondary" hydroelectric energy which we cannot count on during dry water years. We'd like to build up a market in B. C. for lower-cost non-firm energy that we can cut off for a month or two if we have to. But Power Smart saves "firm" energy that's on all the time.

Question:

"How much power will the 29,000 water jackets given out by BCH save?"

Mr. Crockett:

We estimate that the nearly 30,000 water electric water heater insulating jackets will save 500 kW.h per year per water heater, or 15 million kW.h in total each year.

Question:

"Why should I save power if the government is just going to ship it south to subsidize American manufacturing capacity?"

Mr. Crockett:

It is not that simple. First, our domestic load is growing at 3 percent per year. To meet that load, B. C. Hydro will have to build or purchase electricity from new resources by about 1995. That is the energy which will cost more than energy saved by Power Smart. Now if the provincial government wants to license an independent power producer to sell energy to the U.S. at full marginal costs, that's a completely independent transaction.

Question:

"How does BCH separate load growth from "less load" growth due to Power Smart both for the immediate future and the far future?"

Mr. Crockett:

Our load forecasts allow for conservation savings which we think will be adopted by our customers without any promotional help from B. C. Hydro. The savings from Power Smart accelerate these savings so they occur sooner. So Power Smart saves a lot of energy in the near future but less in the distant future; that's already considered in our forecasts.

Question:

"Both Bob Crockett and Larry Bell are excellent; could we have them both on stage on the "same side" of the question? The synergy could be great! (Congratulations on good work.)"

Mr. Crockett:

Glad you appreciated us! I think the Bell-Crockett team will re-appear next year at our Third Annual Electric Energy Forum; stay tuned!

Question:

"You state that the average citizen may not behave as we in the room will behave. But the polls indicate that 70-80 percent of the population say they are ready to recycle and that only 50 percent believe their neighbours are ready to recycle. In other words, double standards are prevalent?"

Mr. Crockett:

I think you have answered your own question. I am ready to recycle but maybe my neighbour is not. Now, how do we get our neighbours to volunteer to recycle? That is where marketing comes in. No amount of legislation or bylaws will make people do what they are not ready to do. So we have to educate and chip away at the problem over time. We will get there.

# Independent Power Producer Update

**Wayne Morgan**

**Manager of Power Contracts**

**B.C.Hydro**

## Introduction of Wayne Morgan by Conference Chairman Don Swoboda:

The second update that we are going to give you flowed from last year's Energy Forum and is related to IPP's, Independent Power Producers or Parallel Generation. Wayne Morgan, who is manager of Power Contracts at Hydro, is in charge of evaluating the proposals that we receive from various independent power producers. It's a role that Wayne has held since September of last year. Wayne has also held a number of other senior management postions in Hydro, in Vancouver, Victoria, and Prince Rupert. Wayne graduated in Electrical Engineering from the University of British Columbia in 1962 and he subsequently obtained a Masters in Business Administration from the University of Western Ontario in 1970. On your behalf, I would like to call on Wayne to address the Forum on an update of the IPP Program. Wayne.

# INDEPENDENT POWER PRODUCER UPDATE

MR. WAYNE MORGAN

MANAGER, POWER CONTRACTS

B. C. HYDRO

First, I want to give you a brief thumbnail sketch of what is going on in the area of non-utility generation. Then I want to open the floor to questions.

It was only eleven months ago at the First Electric Energy Forum that Larry Bell announced important new initiatives for B. C. Hydro to include non-utility supply options in its Resource Plan to meet future loads. Non-utility supply options means independent power production, co-generation, load displacement and energy-efficiency improvements. In fact, some of these probably overlap with some of Bob Crockett's strategies. We will talk more about these options later on.

Incidentally, it may be useful to briefly discuss nomenclature for a minute. We hear the terms IPP's, NUGS, co-generators and all those sorts of terminology. Independent power producers (IPPs) are basically separate generating supply units. Co-generators tend to be attached to pulp mills or chemical plants and they provide surplus electricity. Non-utility generators (NUGS), is a term that is now becoming a little more ascendent and is a generic term that I think we will use more in the future.

It has been an eventful year for independent power producers in B. C. Since the Energy Forum last year B. C. Hydro has signed contracts with the following people: Queen Charlotte Power Corporation, Evans Products at Golden, and Robson Valley Corporation. I think the Minister of the Environment introduced Roger Blagborne, the President of Robson Valley Power here this morning. In addition, we are in the final stages of negotiations with Queen Charlotte Forest Products at Masset, Alcan at Kemano and Howe Sound Pulp and Paper at Port Mellon. The latter undertaking involves what we call load displacement. Howe Sound Pulp and Paper is expanding its mill at Port Mellon. Rather than purchase electricity from B. C. Hydro, the parties have agreed in principle to an arrangement which would see Howe Sound Pulp and Paper develop its own generation to serve the additional load.

All of these negotiations were initiated prior to the past six months and B. C. Hydro calling for competitive proposals for the supply of electricity and load displacement. I would now like to discuss the progress of these competitive offerings. Before I do that, I think it is important to emphasize that we will move very cautiously in dealing with the private power industry to ensure that projects meet our requirements in four areas and basically these are areas that meet our customer service objectives: quality/reliability, safety for both the public and B. C. Hydro personnel, efficiency and cost. We want the lowest cost possible for our rate payers and I do not think that anyone will object to those four key strategies. I am sure you will understand why we will be placing significant emphasis on these critical items and why they will loom large in our evaluation process for each of the following categories:

1. POWEREX - POWEREX's call for "Expressions of Interest" for the supply of 400 to 600 MW of electricity to the export market closed at the end of March. About 20 projects were submitted with a total capacity of about 4000 MW. Clearly, we have a fair amount of choice in these responses. The proposed projects are located in all parts of the province. "Fuel" types include hydro, natural gas, coal, wood waste, and geothermal projects. Evaluations of these proposals are in progress and should be completed by the end of June. The purpose of this offering is two-fold. First, to determine the cost to serve the export market. Second, to develop a short list of proponents who would progress to detailed requests for proposals which would be issued sometime this Fall if the costs indicate that it is economic to do so.

2. The "Request for Proposals" for projects over five MW to supply 150 to 200 MW of electricity for the integrated system closed on May 1st. About 20 projects were submitted with a total capacity of 1200 to 1500 MW. Fuel types were similar to the POWEREX offering, which I have already discussed. B. C. Hydro had asked for proposals, not only for the supply of electricity, but for the supply of load displacement. Load displacement consists of two or three things: possibly self-generation and co-generation, or energy efficiency improvements. For energy improvements of more than 5 MW, we are talking about large industrial processes that are going to save a lot of energy. For the supply of load displacement, either through self-generation or energy efficiency improvements, in fact, we received no offerings. Load displacement is an arrangement in which an industrial or commercial concern develops its own generation or improves energy efficiency such that the energy requirements from B. C. Hydro are measurably reduced. Evaluation of the proposals should be complete by the end of July and negotiations with short-listed proponents should commence shortly thereafter. At this time, it is not clear whether the supply requirement will be satisfied by one large project or several small ones.

While I am on the subject, it may be useful to briefly explain our evaluation and negotiation process. Once the proposals are received the proposals go through a basic process. We do a preliminary screening to make sure that, basically, there are no "tire kickers" in the process and if there are, they are eliminated very early in our study. In detailed evaluation, where we go through a rigorous technical and financial evaluation, we utilize both in-house and external consultants to assist us in this stage. From that detailed evaluation, we come up with a ranking and from that ranking develop a short list from which we will move into a negotiation stage and we call that competitive negotiation. This is different from competitive bidding. We do not simply take the low bidder; we look at all the factors, attempt to meet the objectives of both parties and ultimately to achieve the best return for the rate payers. One of the interesting things that I have noted in both the expression of interest and in the requests for proposals is that, in general terms, the technical and financial strengths of the proponents have been very positive. I think that this bodes well for the future of the program.

The next program is also on the integrated system, the domestic under five MW for a requirement of about 25 MW. B. C. Hydro will be issuing on May 15 an invitation for proposals for these smaller projects. Contractual terms and pricing are standard. The price will be \$.03/kW.h and escalated at three percent per year or the annual increase in the consumer price index, whichever is lower. This offering will be open until August 15 or until the 25 MW is subscribed, whichever is reached sooner. I would like to mention that in your package you have a schedule of our activities for this year. The timing for this particular program is slightly different, so I emphasize that we are opening this on May 15 rather than the end of March and closing in the middle of August. In addition, I should mention that advertising for this proposal started yesterday and continues today and Monday.

Another intesting program that we are dealing with is in the non-integrated areas, that is, those areas that they are not tied to our integrated transmission system and they are usually in remote communities. Fort Nelson is a major non-integrated load. It includes about 15 MW for the town and there is a potential pulp mill requirement that is presently under consideration. A joint venture of West Coast Energy and Canadian Utilities delivered the only submission for this offering. Evaluation of the proposal has been completed and discussions between the joint venture and B. C. Hydro commenced this week. The status of the pulp mill is uncertain at this stage, until the provincial government makes a decision on a pulp-harvesting license.

Port Clements and Masset are also bigger than most of the other remote areas that I mentioned earlier. We are in the final stages of negotiating a contract for the supply of electricity to the northern portion of the Queen Charlottes. The plant would be fueled by wood waste and could be in operation by the end of 1990.

B. C. Hydro recently called for proposals to supply Bella Coola with electricity. So far we have received eight notifications of intent to submit proposals. Proposals will be requested for the other non-integrated areas prior to the end of this fiscal year. So, you will see a fair amount of activity in these smaller communities where we currently provide most of the energy from diesel fuel.

Okay, that is basically our broad program. As you might expect, such a major shift in strategy within B. C. Hydro has the potential for impacting the provincial economy. Some of the things we see happening are a surge in business for environmental, financial and engineering consulting firms. In many cases, new skills are being developed. Several companies are proposing clean-burning wood waste plants to replace beehive burners in a number of communities. A creative search for efficient and effective ways of supplying electricity to B. C. Hydro is occurring. Hydro and wood waste could replace diesel as a "fuel" in some of our non-integrated areas, thus reducing our reliance on petroleum products. Regional development can be enhanced as smaller generating plants are located in various areas of the province. With all of these strategies in mind a potential positive impact on B. C. Hydro's financial statements is likely.

Finally, I should also mention that the non-utility generating industry appears to be very attractive to the financial community. We see substantial interest in providing financial vehicles for various types of projects.

In summary, then, it has been a stimulating year for B. C. Hydro, for the non-utility generation sector and for the service industries that support that sector. As contracts are negotiated and these new suppliers come on-line, we expect our optimism to be justified. Thank you. Are there any questions?

Don Swoboda:

To be sure Wayne, there are a great many, and unfortunately we will not be able to get through all of them, but I will attempt to pose a few to you. "Customer services criteria: How will B. C. Hydro's environmental policy be reflected in your evaluation of IPP Resources?"

Wayne Morgan:

B. C. Hydro's environmental policy will not directly influence these policies, but all independent power producers, non-utility generators will be expected to abide by the provincial regulations and guidelines, just as B. C. Hydro does.

Don Swoboda:

"Why has Hydro not seen fit to require IPP proponents to notify municipal and regional districts?"

Wayne Morgan:

I am not sure that that's something that B. C. Hydro should be requiring. We did release the names of all of the expressions of interest proponents and all the site locations for each of those projects in a press release earlier this week. In many cases the independent power producers have been in contact with communities well in advance of submitting their proposals.

Don Swoboda:

"Is transmission cost included in determining B. C. Hydro's marginal costs for IPP pricing?"

Wayne Morgan:

To some extent, yes. There are a lot of people in the audience that can answer that better than I can. I believe that the transmission costs to our Kelly Lake substation are included in our marginal cost estimates.

Don Swoboda:

"What is the public's role in the evaluation of the proposals?"

Wayne Morgan:

We expect no public input during the evaluation. It is a business process that we are undertaking, and the negotiations are confidental. We do not see any way that the public could participate in that process.

Don Swoboda:

"Will IPP's be allowed to build Keenleyside or Murphy on the Columbia where upstream regulation was built and paid for by the province?"

Wayne Morgan:

Generally, we have advised those proponents who are submitting proposals for Keenleyside, Murphy Creek and Seven Mile that we will consider proposals that provide significantly lower costs to B. C. Hydro, and that at some point in the future these projects would revert to the public domain. One option would be to utilize something that we call a "build, operate and transfer scheme." In other words, the proponent takes the construction risks and operates the plant for a fixed period of time-say 25 or 30 years and then that project is turned back to B. C. Hydro or the province.

Don Swoboda:

"How soon do you expect to export the 400-600 MW of power?"

Wayne Morgan:

There is an evaluation of the U. S. electricity market taking place right now, and some decisions are expected to be made late in the summer.

Don Swoboda:

"Why do your screening and evaluation procedures make no explicit mention of environmental acceptability. You mentioned only technical and financial criteria?"

Wayne Morgan:

I think I have already answered that one. We expect that, once projects are evaluated and short-listed and we go into a negotiation procedure, they will ultimately have to meet all of the provincial environmental guidelines. In that regard, we work closely with the various ministries in the provincial government.

Don Swoboda:

Finally, the questions that you have given us that we have not time to deal with will be answered in the Proceedings that will be provided to you. One final question; "How would you assure system protection?"

Wayne Morgan:

That sounds like a B. C. Hydro question. That is very important to us and I talked about safety, quality and reliability. We have some very rigorous inter-connection requirements and procedures which non-utility generators would have to meet. We are very confident that these requirements will provide protection.

## QUESTIONS ANSWERED BY MR. WAYNE MORGAN AFTER THE FORUM

Question:

"Will B. C. Hydro seriously consider new measures to encourage proposals for load displacement through energy efficiency given the lack of proposals in the area to date?"

Wayne Morgan:

Definitely. Our offering was clear and specific with respect to requesting proposals for load displacement. We will be issuing another Request for Proposals in November, 1989, and it will include load displacement requirements.

Question:

"Will the public be invited to approve or reject environmentally dubious generation methods such as the burning of coal or municipal solid waste? If not - why not?"

Wayne Morgan:

All projects must be submitted to the provincial government to ensure that environmental regulations are met. For projects over 20 MW, where the government feels that a public inquiry is appropriate, they will ask the B.C.U.C. to carry out a review of the project.

## Thanks to Mr. Wayne Morgan by Conference Chairman Don Swoboda:

Thank you very much Wayne. On your behalf, I would like to extend our thanks to Wayne, for your most informative update on a very challenging and interesting area of our resource base. The task that Wayne has in front of him, and what he has already put behind him, has certainly been the result of a lot of commitment and hard work. I can tell you that there is a commitment on behalf of the organization to explore fully the opportunities in our resource base that might come from the independent sources of energy in the province. So, I thank Wayne, on your behalf, for a very informative update on that important process.

# QUESTIONS ANSWERED BY MR. MORGAN AFTER THE FORUM

Question:

"Will IPPs be considered where they are higher cost than BCH's marginal cost if environmental benefits and/or regional development result?"

Question by: Niel M. Nielsen

Wayne Morgan:

All other things being equal, B. C. Hydro would consider the project which was most environmentally sound and/or which contributed most to regional development.

Question:

"Are there plans to issue another Request for Proposal (RFP) for proposed projects greater than 5 MW this year and/or next year?"

Wayne Morgan:

Yes. Another RFP will be issued in November, 1989. The requirement for another RFP in 1990 will depend on our Resource Plan and the need for additional energy.

Question:

"Your customer service criteria totally ignore environmental considerations - are you encouraging independent power generation for export with no concern about the environment?"

Wayne Morgan:

Environmental requirements are treated separately from customer service. The provincial government, in cooperation with B. C. Hydro, reviews the environmental and socio-economic impact of projects. This approach will be used for both domestic and export projects.

Question:

"Will energy efficiency improvements benefit B. C. by reducing total loads and reducing total environmental impact or will the savings be used in sales of power to the USA, i.e. will energy conservation result in fewer dams, or merely in more energy-export dollars?"

Wayne Morgan:

Energy efficiency improvements will benefit B. C. by reducing total loads and environmental impact. The savings will go to B. C. Hydro's ratepayers. The export strategy will not cost B. C. anything. Instead, it will provide increased regional development and direct economic return to the province.

Question:

"How do you expect to sell Power Smart and conservation when you're inviting proposals for export (which implies an excess of power)?"

Question by: Deb Sherwood, Environment Canada

Wayne Morgan:

The answer here is similar to the previous question. It should be noted that there is no surplus of firm power. The decision to export is an economic one, and will provide benefits to the province.

Question:

"What is the evaluation fee for domestic (less than 5 MW) IPP proposals? If there is one, could it not be proportional to power output?"

Question by: Don Scarlett

Wayne Morgan:

The evaluation fee for independent power proposals for projects less than 5 MW is $500. The idea of a proportional fee will be considered, although it should be noted that we are trying to keep the fee at a minimum already.

Question:

"Are environmental impact limits more stringent for export projects than for domestic? Please elaborate."

Question by: Anne Edwards

Wayne Morgan:

All generation projects, whether built for export or domestic purposes, must meet the same governmental requirements for the environment.

Question:

"Is an energy policy concerning natural gas use for electricity export forthcoming?"

Wayne Morgan:

We are not aware of such a policy.

Question:

"What concern is given to environmental matters in evaluating IPP and New Utility Generator proposals?"

Question by: Fred Sverre, Entech

Wayne Morgan:

Independent power producers must meet the same provincial requirements for the environment as B. C. Hydro.

Question:

"Efficiency at lowest cost, these are your criteria - not a word on environment - are you simply trying to get the private sector to do your dirty work - given Hydro's new policy should you not review the environmental aspects to ensure these IPPs are compatible?"

Wayne Morgan:

As noted earlier, environmental requirements are treated separately from customer service. The provincial government, in cooperation with B. C. Hydro, reviews the environmental and socio-economic impact of projects. This approach is used for both domestic and export projects.

Question:

"You say you view all factors in the short list with cost a major consideration - how can you be certain of the cost when you do not consider environmental impacts?"

Wayne Morgan:

See answer to the previous question. Independent power producers must meet all provincial environmental requirements, and must include appropriate funds in their estimates to meet such requirements.

Question:

"Describe the generating resources Howe Sound Pulp and Paper will use to meet its load growth for mill expansion?"

Wayne Morgan:

Howe Sound will build an 85 MW co-generation plant which will serve their increased energy needs, which would amount to about 700 GW.h annually.

Question:

"Relative to theme of Forum, why isn't environmental included in the list of evaluation criteria?"

Wayne Morgan:

Environmental factors are included in the request for proposals. B. C. Hydro cooperates very closely with the provincial government in reviewing the environmental and socio- economic impacts of the various proposals.

Question:

Is there a party within Hydro or government attempting to identify potential New Utility Generator projects of merit in order to bring them to the attention of possible proponents?

Wayne Morgan:

No. It is expected that independent power producers will develop their own ideas for projects.

Question:

"Customer Services criteria - how will B. C. Hydro's environmental policy be reflected in your evaluation of IPP resources?"

Wayne Morgan:

As answered earlier, environmental requirements are treated separately from Customer Service. The Provincial Government, in cooperation with B. C. Hydro, reviews the environmental and socio-economic impacts of projects. This approach is followed for both domestic and export projects.

Question:

"Why has Hydro not seen fit to require IPP proponents to notify municipal and regional districts?"

Wayne Morgan:

It is important that there be strong communication at the local levels, however there may be little value in an independent power producer meeting with local officials until such time as a project is identified on B. C. Hydro's short list. B. C. Hydro has been releasing the names and locations of all projects to the press.

Question:

"In determining BCH marginal costs for IPP pricing is transmission cost included?"

Wayne Morgan:

Our marginal cost of capacity and energy estimates, which are reviewed and updated annually, are based on today's average cost of energy from a mix of new generation projects, delivered to Kelly Lake. Hence major transmission losses to the grid are allowed for. Additional subtransmission and distribution losses are assumed to be common to all alternatives.

Question:

"What is the public's role in the evaluation of the proposals?"

Wayne Morgan:

The public is not directly involved in evaluation of specific proposals, but the First Energy Forum was devoted to obtaining input from the public, including independent power producers, concerning requirements that should be included in our policy and in our request for proposals. Also, the provincial government may decide that certain projects should go to the B.C.U.C. for public inquiry. Finally, B. C. Hydro invites opinions as to how the request for proposals should be structured, and how the evaluation process should be developed.

Question:

"Will IPPs be allowed to build Keenleyside or Murphy on the Columbia River where upstream regulation was built and paid for by the province?"

Question by: N. Nielsen

Wayne Morgan:

Independent power producers will be able to submit proposals for Keenleyside and Murphy Creek on the Columbia River, providing that:

1) The price is lower than other alternatives; and

2) The project is returned to B. C. Hydro after a specific time period, say 30 years. A "Build-Own-Operate-Transfer" approach would be the likely vehicle.

Question:

"How soon do you expect to export the 400 to 600 MW of power?"

Wayne Morgan:

The quantity of power and the timing of the requirement would be more clearly defined in a study of the export market, currently being carried out. At the present time it is anticipated that the energy would be required starting in the period 1995 to 2000.

Question:

"How would you assure system protection?"

Wayne Morgan:

System protection is assured in a number of ways:

1) Detailed connection documents are included with our requests for proposals;

2) Proponents must indicate how they propose to meet the standards; and

3) Specific requirements would be included in the contract.

Question:

"In view of the financial and diversification value of small (less than 5 MW) Hydro projects to small communities, the low environmental impact and the flexibility it can add to the B. C. Hydro system (especially in rural and remote areas), would B. C. Hydro consider extending its requests for proposals past the 25 MW limit and make its proposal fee proportional to project size, up to the present $500 limit?"

Question by: Donald Scarlett, Electric Consumers Association &
Kootenay Small Hydro Power Association

Wayne Morgan:

We will consider both of these suggestions.

Question:

"Will B. C. Hydro allow IPPs to contract with third parties? If so, what will wheeling arrangements be?"

Wayne Morgan:

Although B. C. Hydro has not finalized its wheeling policy, it is intended that independent power producers will be able to sell directly to third parties for loads that are new, or incremental, to Hydro's system. Hydro's wheeling policy should be in place by the Fall of 1989.

However, B. C. Hydro will consider wheeling proposals prior to that time.

Question:

"Is the 3¢/kWh purchase rate your average cost of generation or your avoided cost? Does 3¢ reflect the full social and environmental cost? Should purchase rates be determined by an independent party?"

Wayne Morgan:

It is assumed from the question that under 5 MW projects are the subject of discussion, and for that category, the price allows for energy deliveries which are not firm and which may be off-peak as well. In addition, the administrative costs of dealing with small suppliers is relatively high. With respect to whether the price reflects the full social and environmental cost, all requests for proposal documents and model contracts indicate to the independent power producer that it is necessary to meet all government environmental and regulatory requirements.

B. C. Hydro seems to be the best body to determine prices for purchasing power since they are the most knowledgeable about costs to serve their customers. It is important to note that the B. C. Utilities Commission will act as a third party review of all contracts signed between B. C. Hydro and independent power producers. The B.C.U.C. will be acting to protect the interests of B. C. Hydro's ratepayers.

Question:

"Will the introduction of energy from IPPs shift the burden of environmental impacts from the public to the private sector? It is generally more difficult to regulate the private sector."

Wayne Morgan:

Environmental regulation of IPPs may discourage some aspects of the industry depending upon the costs which will be necessary to meet environmental requirements. Some projects may not be competitive. In the final analysis, B. C. residents are likely to continue to want more electrical energy, and they will have to make decisions on the trade-offs required.

Question:

"Will the environmental regulation of IPPs discourage development?"

Wayne Morgan:

Hydro's purchase rates reflect environmental costs to the extent that our Requests for Proposals require that successful proponents must meet all regulatory and environmental requirements of the provincial government as a condition of the electricity supply contract.

Question:

"Would B. C. Hydro be prepared to pay 6¢/kW.h, if that is the full cost of electricity delivered to the residential customer?"

Wayne Morgan:

It is difficult to say what price we are prepared to pay. Independent power producers will submit competitive bids, and Hydro will subsequently enter into competitive negotiations to obtain the best deal for B. C. Hydro ratepayers. If we are unable to obtain reasonable prices, it is conceivable that Hydro would build their own projects.

Question:

"Does the Province of British Columbia have regulations governing acid emissions from thermal powerplants? Will thermal IPPs be subject to emission controls?"

Wayne Morgan:

Yes. Thermal Independent Power Producers (IPPs) will be subject to emission controls, along with all other environmental requirements of the provincial government.

Question:

"You have made your guidelines public - you have embarked on a variety of programs which must comply with your guidelines yet why do you not have a definition of social and environmental cost? Should this definition and methodology for determining social cost be decided at a public hearing?"

Wayne Morgan:

There is at present no universally accepted method of measuring social costs. This is frequently a personal issue or at best an issue that is important to a community or local area. For example, an unrestricted view of a mountain may be very important to one person but not to his neighbour. In general, social costs are inferred by the public and often change with time. The issue of nuclear generated electricity may be a very good example, for in Ontario they are judged acceptable by the population at large; however, in B. C. nuclear plants are probably not acceptable.

Many environmental parameters are also not quantifiable in an economic sense, for example, what is the value of an ecosystem? Some effort has been made to place a value on environmental resources used consumptively, such as recreation, fish, large wildlife species. A range of values was established by calculating the "Willingness to Compensate" and the "Willingness to be Compensated". The first approach asks the question, "How much are you willing to pay for the privilege of doing a certain activity such as canoeing"; while the second asks "How much would you have to be paid to give up that activity?" As you might guess the values vary widely.

We would be happy to adopt a publicly-agreed upon method of determining social and environmental costs.

Question:

"How can B. C. Hydro encourage IPPs for export when it cannot yet determine what social costs are?"

Wayne Morgan:

Hydro is coordinating the export of electricity through the POWEREX subsidiary in future to markets in the United States and an expressed desire by private entities to supply that market. Whether the export of this resource is acceptable to the British Columbia public, as are many other resources, remains to be decided.

Question:

"Will B. C. Hydro take its leadership role to its fullest extent and request/suggest environmental assessment legislation?"

Wayne Morgan:

Legislation is the responsibility of the Provincial Government. In environmental matters it is our preference to address the issues by identifying the impacts of our activities and developing programs to sustain the resources that are affected. This will be done with the involvement of the responsible government agencies and with the public. We are prepared to go beyond requirements of the existing environmental legislation.

Question:

"I would like more information about POWEREX. Who should I contact for clients interested in beginning to discuss possible power supply arrangements for U. S. industrial loads?"

Question by: H. E. Grant, Attorney, Seattle

Wayne Morgan:

Under the present policy, it will not be possible for IPPs to make direct arrangements to serve industrial loads in the U. S. IPPs must market export power to POWEREX and POWEREX will make the contractual arrangements with purchasers in the U. S. In any event, it is unlikely that POWEREX would sell directly to industrial customers in the U. S., but rather the sales would be to U. S. utilities.

In order to qualify to sell export power to POWEREX, IPPs must have responded to Powerex's call for "Expressions of Interest" which closed on 31 March 1989. Other requests for "Expressions of Interest" will be issued as the need arises.

If you would like further information on matters related to POWEREX, please contact Mr. Graeme L. Simpson, at POWEREX, phone 663-4041.

# Environmental Protection and Sustainable Development

**Dr. Donald Chant**

**Chairman and President of the**

**Ontario Waste Management Corporation**

## Introduction of Donald Chant by Conference Chairman Don Swoboda:

The next speaker joining us also reflects the outstanding resources that I think this Forum has been able to attract for our topic of sustainable development. Donald Chant is Chairman and President of the Ontario Waste Management Corporation which is responsible for creating a toxic waste management system for the Province of Ontario. Dr. Chant obtained a Bachelor's Degree and a Master's Degree from U.B.C. and received his doctorate from the University of London. He has held various positions with the Canada Department of Agriculture, as well as academic positions with universities in Canada and the United States. Dr. Chant has been Chairman of the Wildlife Toxicology Program funded by Environment Canada and the World Wildlife Fund. He has been a member of the National Task Force on the Environment and the Economy, science advisory board of the International Joint Commission on Great Lakes Water Quality, and the Executive Committee of The Worldlife Fund Canada. Dr. Chant is author of many papers and books on entomology, forestry, and environmental matters.

He has received numerous awards and honorary degrees including Officer of the Order of Canada, the White Owl Conservation Award and the distinguished Public Service Award from The Federation of Ontario Naturalists. We are indeed delighted to have Dr. Chant join us for the concluding presentation of this Forum in which he will speak to us on environmental protection and sustainable development. I give you Dr. Donald Chant.

# ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT

DR. DONALD CHANT,

CHAIRMAN AND PRESIDENT

ONTARIO WASTE MANAGEMENT CORPORATION

Thank you Mr. Chairman, ladies and gentlemen. First of all, I would like to thank our hosts for giving me this opportunity, not only to address you today, but to listen to the discussions that have been taking place over the last two and a half days. I give credit, a lot of credit, to B. C. Hydro for showing leadership in this respect and for opening itself to outside comment. I used to live in British Columbia when I went to University. I still have family living here and for those of you who do not know it, but I suspect most of you do, it would have been absolutely inconceivable to have this kind of conference even as recently as five years ago.

I am happy to tell you that I have not been asked to give you a long litany of environmental problems and catastrophes this afternoon. I think this audience scarcely needs to be reminded of those things, but I find myself in the very unenviable position of not being able to say anything new at all. I have listened to many of the discussions and speakers, I dropped in on the round tables yesterday and today and I cannot think of anything that has not been said in one way or another. The high degree of consistency between the excellent presentations that you received from the workshops is testimony to that. So, what I am going to do is simply give you my views. Some of them, you will have heard. Maybe you will find something, not new, but perhaps with a different perception or a different slant on some of the issues we have been talking about these last two days.

Specifically, I have been asked to talk to you about the issue of sustainable development and environmental protection and to try to put this into the context of the issues that we have been considering here at this conference. I want to do this first by sharing with you some general impressions I have on the whole question of sustainable development and what it means for the future. Then I want to place this in the context of British Columbia and the issues that we have been discussing.

Let me begin by saying that the issue of sustainable development is not a new idea. Back in 1972 a group called the "Club Of Rome" published a book called "The Limits To Growth." People at that time did not see any immediate crisis, so the book tended to be dismissed. It also had some unfortunate statistical flaws and perhaps overly pessimistic time-frames that made it all too vulnerable to attack by those who did not like its message. Closer to home, in 1973, our own Science Council, The Science Council of Canada, coined the phrase 'The Conserver Society.' The Council said that, "We have to move from a society preoccupied with consumption to one with more constructive goals." In 1980, The World Conservation Strategy urged that we must save the natural environment in the long-term interest of the human race.

As you all know, these issues gained real momentum with the release of the Brundtland Report in 1987. The U. N.-sponsored World Commission, a group which Canada helped to fund, brought together 22 business, political, academic, and environmental experts from 21 nations around the world. The Commission was headed by Madame Gro Brundtland, now the Prime Minister of Norway. As you also know, it had two Canadians on it, one of whom we heard from the other night, Maurice Strong, and there was also Jim MacNeill who acted as the Secretary General of the Commission and is now very active in developing the concepts of sustainable development at the Institute for Research on Public Policy in Ottawa.

The report of the U. N. Commission warned in the strongest terms that the world is in deep trouble. It concluded that we cannot go on as we are. We must harmonize our environmental and economic interests. We much achieve a state of sustainable development, and soon. Even before the Brundtland Commission finished its report, Canada, through The Canadian Council of Resource and Environment Ministers (C.C.R.E.M.) created its own national task force on environment and the economy, to prepare a Canadian response to the Brundtland Report and to recommend actions for Canadians. Theses actions were directed at the First Ministers' Conference and at the Prime Minister. I had the honour of serving on that team of 17 environment ministers, business, and environmental representatives. I take great pride in this initiative on the part of C.C.R.E.M. Canadians are not very often first in the world in exciting new thinking and new innovations, but Canada was the first in the world to respond to the Brundtland Commission. What was surprising in this task force was that all of these men and women, who all too frequently have been opponents, jointly signed a document addressed to the Prime Minister and the Provincial Premiers calling for dramatic change. For the first time in Canadian history, senior representatives of government, environmental groups, and business talked openly and frankly about the urgent need to do things differently to protect our environment and our own long-term well being.

The task force recommended a series of transition teams or "Round Tables on the Environment and Economy" which are to help Canada understand what is happening to the environment and what must change. Our recommendation was that these "Round Tables" in each province and in Ottawa should be made up of senior cabinet ministers, business leaders, environmentalists, natives, farm labour and other interests. So far, Nova Scotia, Prince Edward Island, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, and as you heard from the minister today, British Columbia, have created their Provincial Round Tables. The federal government named the chairman of the National Round Table last fall and in March appointed its members. The remaining provinces and territories are not far from naming similar groups.

All of this is encouraging progress, but two questions continue to bother me: first, what does sustainable development really mean? Do we have any common understanding in Canada of the meaning of this term? Secondly, where will the leadership come from which will enable such groups to bring about real change?

I have seen many definitions of the term sustainable development recently, and we still have some distance to go in agreeing on what we are talking about. Some believe the term means "continuing development." In other words, "business as usual," with just a few wrinkles added. Others believe that sustainable really translates into "economic development"; we need economic development. Some even go so far in another direction to suggest that it means "negative development" because they claim we have already exceeded our limits. The Financial Post recently said that sustainable development means living off the interest of our environmental and resource capital rather than spending the capital itself. I personally think that is not a bad definition to use in getting our discussions across this country underway. I am going to come back to this issue of definition a little later on.

However, I think that most business and political leaders are still somewhat suspicious of the term. Many, perhaps, would prefer that we continue discussing it rather than implementing it. But what does it mean in the context of energy planning in British Columbia and indeed across the country? How can we achieve a steady state in the face of exponential demands on the environment, demands to accommodate an exploding population, demands for food, for space, for resources, for energy?

I think that this means big changes are ahead for the energy business. We simply cannot keep producing electricity in ways that produce vast amounts of acid rain and gases that cause climatic change. Nor can we dam every large river in the world or build a nuclear power plant in every city. It is true, we are facing an energy crunch in the very near future. It will not simply be one of supply, although eventually our fossil fuels will run out or become prohibitively expensive to use in this way. The real limits are being imposed by the limited ability of the biosphere to absorb the byproducts of this energy use. From now on, we have to measure our energy options, not only in terms of their economic impact, but in terms of what they will do for the sustainability of our environment. In other words, our forms of energy development must be environmentally sustainable.

Let us look at the track record of our major energy sources. Acidification in the environment is a very big issue where I come from, and a growing issue in British Columbia. Half of the lakes in eastern Canada are at risk from acid rain, along with our forests, our buildings and our very lungs. Much of the acid rain and related pollution that we worry about comes from energy production and, of course, energy consumption. The big energy sources are coal burning power plants and automobiles in the United States and Canada. Acid rain is bad enough, but the greenhouse gases such as carbon dioxide and nitrous oxides from the burning of carbon-based fuels have even more serious implications for the world as a whole.

Carbon dioxide, as you know, comes from the burning of every carbon fuel - coal, oil, and wood and even from human respiration. This pumps about six billion tonnes of CO2 into the atmosphere every year and you could add another one or two billion tonnes each year from the burning of the tropical rain forests. Last year, two major international conferences, including one in Toronto hosted by the Prime Minister, warned that the world must cut CO2 emissions in half if we are to head off climatic warming; and that comes at a time when global energy demand is really taking off. This demand for cutbacks has great implications for Canada since we are, per capita, one of the greatest emitters of CO2 in the world; being exceeded only by East Germany, the United States, and Czechoslovakia.

What about the environmental impacts of the other big source of electricity in Canada, water power? Hydro has the image as being the cleanest source, but as you know, it has many side effects. The most obvious is the loss of wild rivers and scenery and the destruction of forests, habitats, and ecosystems. I think we have the view in Canada that we still have a lot of wild, free-flowing rivers to develop in Canada. However, according to surveys made as recently as five years ago, nearly half or 86 out of 178 of our major rivers have already been dammed for hydroelectric power, flood control, or irrigation. As you know, as the list of rivers being dammed keeps growing, so does public resistance. Witness some of the situations across Canada today.

The point I am trying to make here is not that we must stop all power development. Of course we cannot, but development in the future must be done differently. Clearly the public is becoming increasingly unhappy with many of the side effects of past practices. From what I have heard in the last couple of days, B. C. Hydro is certainly making progress on doing things differently. Some very refreshing ideas and policies have been discussed here. But just because we do not have some magic source of clean, abundant and non-controversial energy sitting out there does not mean that we do not have other options. A growing number of studies, including the Kieran's Energy Option Report of last year, tell us that it is time to get serious about energy efficiency, energy conservation, and the capture of waste energy or co-generation.

Again, I am impressed by some of the things that have been discussed today, but I think there is a question as to whether they go far enough. We tried energy conservation after the oil embargos of the early 1970's and it worked in a modest sort of a way. People actually did learn to turn down the thermostat, turn off some lights, and go easier on the gas pedal. The economy did not grind to halt or collapse as we tried energy efficiency in this country. It worked to a degree. Modern cars use 30 percent less fuel than those made before the 1973 oil embargo. Homes are better insulated, modern furnaces waste far less fuel than older ones. The problem is, to use that example again, when the price of oil fell, people relaxed and thought well, thank God that is over, now we can go back to burning fuel without concern just like in the good old days. I like energy efficiency a lot because it means using our brains rather than brawn to get things done. The Kieran's Report suggests that, with available technology, we could reduce energy demand profitably by 20 to 30 percent without reducing the output of goods and services in this country. If governments, our utilities and industry are going to fund one energy sector right now, it should be increased energy efficiency. If we are going to give tax breaks to people, let it be for things like increased energy efficiency, so that industry can economically install equipment and people are encouraged to buy appliances that do the same work with far less juice.

Co-generation, of course, is another huge untapped resource. We now discharge gigantic amounts of energy back into the sky and the waters as waste heat. In some cases, this actually creates a pollution problem by overheating lakes and rivers. It is as if we were leaving an oil well flowing into the ground instead of using it as fuel. There are ways of capturing this heat, as you have all heard, and using it to generate electricity. Power turbines, heating buildings, or growing food in greenhouses, despite the recent very unhappy experiences in Newfoundland, are all potential uses of co-generation.

It is obvious that there will be increasing pressure to switch to lower carbon dioxide fuels for example, oil which has about three quarters the carbon that you get from coal. Natural gas produces only about half the carbon of burning coal. On the other hand, synthetic liquid fuel made from coal leads to even greater CO2 emissions than from the coal itself. There are other fuel options, alternative sources of energy. We can burn garbage and the methane gas that is emitted from garbage. We can burn renewable fuels such as wood. We can even burn grains, once they are distilled into alcohol. But the burning of any fuel must be under tight scrutiny because of air emissions, particularly of greenhouse gases. They will have to fit into the scenario of overall CO2 reductions.

I have left nuclear power to the last because it remains such a question mark. Obviously, it does not produce greenhouse gases or acid rain, but it still has many unanswered questions in terms of radiation safety, especially in terms of waste disposal and, of course, in terms of public acceptance. Fusion might turn into a useful source of energy, but I personally would not bet the farm on it, certainly not for a generation or two.

Energy efficiency is not simply conservation with its Spartan connotations of denial, of lowered thermostats, of restricted driving and things like that. Rather it can be getting the same or better service from less energy by substituting ingenuity for brute force. This was a statement made by the Federal Energy Options Advisory Committee in 1988. This committee also said that available technology could lower energy use by 20 to 30 percent without reducing output in terms of products and services. So, as has been suggested by some of the workshops, this suggests very strongly the need for more R&D to increase the potential. We must also, encourage investment in more efficient facilities and equipment, by installing more efficient windows and lightbulbs, and more efficient equipment like refrigerators.

Ontario Hydro, through its chairman, said in 1988 that it will spend 100 million a year or 1.5 billion over 12 years to encourage private companies to generate their own power, and we have heard something about that today. The chairman of Hydro says it makes good economic sense. It goes without saying, I think, that such private generation will have to meet the toughest environmental standards. Otherwise, we have just shifted the base of our problem. Also, as Monte Hummel said yesterday, we have to do more to match the form of energy more closely to the end use; there are sometimes better ways for heating and cooling than by using electricity. Historically, and still today, we tend to measure the successes of our utilities, whether crown agencies or privately owned, in terms of their growth and expansion and in terms of increased revenues and increased profits or surpluses.

Realization of the absolute necessity of implementing the concept of sustainable development forces us to develop an entirely different approach to the generation, economics, and marketing of energy. This new approach will measure success not only in terms of production and consumption, but also in terms of conservation. It will measure success in terms of limiting growth while still meeting legitimate needs. It will mean developing a system of true costing of energy production, about which we have heard - true costing of energy distribution and use that will reflect the realities of air pollution, global climatic changes, and the environmental and social disruption of dams, transmission lines and new power plants. It will mean developing rates that reward the conservers and penalize the wasters of energy. It will require the development of stronger incentives to encourage R&D on low-impact technologies, for the installation of low-energy appliances in energy-efficient homes and buildings, and for the establishment of low-energy industries. In short, it will require the exploration of entirely different approaches to the development of energy systems.

Peter Pearse, yesterday, noted that inertia is a great barrier to these changes that we are discussing. This is a very human failing. We always want to choose the easy course and often the easy course, or the seemingly easy course, is to do nothing. But I think this undeniable fact of inertia should give a strong signal to the boards of directors of institutions such as B. C. Hydro, to C.E.O.s and Chief Operating Officers, and to other Senior Managers. Look for inertia in your system, look on it as a barrier and an impedement and root it out.

Turning to a different topic, I am also concerned about the frightening phenomenon of exponential curves. Almost everything that we measure and have measured in the last few generations, is riding an increasing, exponential curve, especially since the Industrial Revolution which took place in Great Britan in the 1750's. Of special concern to me are the exponental functions with respect to things that cause environmental impact. Among them, of course, are our energy demands; our pollution of the environment; our use of water; our use of biocides, such as pesticides; our expansion of transportation systems; and our human population. All of these have been rising in a classic exponential way since the mid-18th Century . As an ecologist and a biologist, I know that exponential growth cannot continue in a finite system such as this planet of ours. When animal populations exceed the carrying capacity of their environment, retribution is very certain, usually very swift and usually very unpleasant. Animal populations which do that, and we are animals, crash. It is as simple as that. We are not immune to those natural laws, the only question in my mind is, when? It is only a matter of time, if we carry on the way we are now. So why not manage ourselves and our demands for these things, rather than blindly testing the outer limits.

By the time we get to these limits it may well be too late. Very long lead times are necessary to head off some of these exponentially increasing demands. Take human population, just as an example. No matter what we do as homo sapiens today, the human population will double by the year 2025. There is absolutely nothing we can do about that. So we must begin now, if we are to level our population explosion 50 years from now and beyond. It is ironic that most of the polls in Canada and most other developed countries today conclude that most of us think that our population is about right today. We do not realize that we are helpless to prevent it from doubling within the lifetime of our children. Peter Pearse showed us some cynicism with respect to predictions like this in his reference to The Club of Rome Report. He said it was Malthusian doom and gloom, if I recollect him properly. The only thing wrong with The Club of Rome Study, in my view, is that its time frame was too short. Its predictions will still come true if we take no actions. In my view, it is better from time to time to be Malthusian than to be a blind subscriber to the optimism of Dr. Pangloss, who claimed that "everything is for the best in this the best of all possible worlds."

With population it is all too easy to say that it is not our problem. It is a problem of the Third World. That is where many Canadians believe the problem lies, and in certain terms it is undeniably true. In social, in political terms and sometimes in economic terms it is true, but in terms of resource depletion and environmental impact, which is what this conference is all about, it is not true. It is not the case because of the enormous disparities between the industrialized and non-industrialized world, our standards of living and the standards of living elsewhere. Just to give you an example, each Canadian, uses about 100 times, per capita, the resources used by a person in the Third World. This means that 28 million Canadians have the impact of 2.8 billion people in the Third World, about 3.5 times the impact of the whole country of India. We are too quick to feel that the problem is theirs rather than that the problem is ourselves. The problem is abstract to us, but it should not be abstract to us and it is certainly not a problem that is somewhere else, it is a problem that is right here on our doorstep.

Another factor that bothers me, and I have not heard much discussion of this at the conference, is incrementalism. We are very slow to notice

incremental change :o our environment and to the impacts on ourselves.
A little degradati here and a little degradation there does not
capture our attent i in the same way as a mega-event or a dramatic
catastrophe. On a lobal basis, the Valdez oil spill was but a small
fraction of the oi spilled into our oceans and our waterways each year,
and yet, the latte goes almost unnoticed. Peter Larkin, the former
Dean of Graduate S lies at UBC, had a very neat little example of the
consequences of in ementalism that he drew from zoology. Frogs have a
nervous system tha is not well attuned to detecting and alerting them
to small changes i heat. You can literally take a frog, put it in a
jar of cold water I very, very incrementally increase the temperature
of that water and frog will not jump. It cannot detect those little
changes and it wil it there and cook to death before it will take any
action. It is sim because it is lulled by this incremental, very
gradual increase. hat bothers me very much because I see our tolerance
to incrementalism erywhere. When did you last read about Valdez? It
has disappeared in he newspapers in Toronto where I live. It has been
two or three weeks nce there was anything about Valdez and I am sure
that is the way it ll remain.

Now, I would like go back to this question of the definition of
sustainable develo nt. Clearly, we are still having difficulty
arriving at a comm definition of the phrase, a common understanding of
the concept of sus nable development and of its implications. What
will it mean to us What will it mean to our country? What will it
mean to our famili To our descendants? In my opinion, it is
question number on or these round tables, the national and provincial
Round Tables that spoke about earlier.

In the development this concept, I make the assumption that everyone
is being sincere, eryone is acting in good faith and that our
differences are on of perception, of values, and of mind-sets. It is
far too early to d rmine if the way that some former "rapers and
pillagers" of the ironment are climbing on the sustainable
development bandwa is a scam, or because they do not understand the
concept, or they u rstand it in a different way than I do. Jack
Davis, for whom I e a great deal of respect, (I have known Mr. Davis
since he was the F ral Minister of the Environment long ago), almost
unconsciously in h talk yesterday, used several times the term
'sustainable growt in his speech. Well, sustainable development does
not mean to me sus nable growth, but I can understand why it might to
Mr. Davis. I find at this is a common approach or perception on the
part of economists d engineers and, as you know, Mr. Davis is an
engineer.

Others refer to it "continual growth" rather than sustainable growth
or sustainable dev pment. Mr. Mulroney does that everytime he refers
to it. He talks a t continual growth. Now that to me that is a
pretty serious mis erstanding and it is certainly a long, long way
from what I unders d by sustainable development. You cannot have
continual growth a nfinitum, forever and forever. Growth must be

limited, growth must be controlled, the only questions are when and how we take the actions to achieve that objective. Others, particularly in the business community, insist on sustainable economic growth. This frankly gives me less trouble because I can conceive of some economic growth that is either neutral or benign in terms of impact. Some service industries, for example, can grow economically without harmful or serious effects on the environment.

The whole business of coming to grips with waste management in this country, in ways that some European countries have been doing for as long as 15 years, requires careful consideration. The whole business of developing better technologies for recycling, better initiatives for recycling, providing services to recycling initiatives in industry, all of those forms of economic growth I see as largely benign and there are other forms of growth that we all regard as benign, indeed, often as highly desirable: Intellectual growth, growth in health care, growth in education and literacy, certain types of leisure growth, spiritual growth, and so on. All of these are very positive and have benign consequences to us. So, nobody should ever take the position of being totally opposed to any kind of growth and totally opposed to any economic growth; it is not that simple.

However, we must soon come to grips with a common understanding of the term 'sustainable development' of a common definition and clarification of what it means. Only then will we know how deep the divisions are among us and what the concept of sustainable development will mean to Canadians, to British Columbians, to B. C. Hydro, to whoever. Only then will we really know if the emperor does or does not have clothes, a question that Monty Hummel raised yesterday.

This brings me to perhaps the most important thing that I want to say to you this afternoon. Nowhere could I see in the presentations from B. C. Hydro and from the politicians, a clear understanding that there must be limits on new initiatives and new developments, that there are some things that we should not do, not do at all. Jack Davis said a lot about how we can do what we want, better ways of doing what we want and that is terrific; I have no argument with that at all. But it does not stop there and he and other speakers have not mentioned anything that we should not do at all.

We heard a lot about B. C. Hydro's environmental guidelines and I fully support those, they are very worthy make no mistake about that. But, when all is said and done, guidelines simply set conditions for doing things, they deal basically with mitigation, how to minimize the impact of a new dam, a new transmission line or a new stack somewhere. In essence, how do we minimize emissions? That is what guidelines deal with. In essence they tell us how to minimize emissions from a stack when perhaps we should solve the problem by having no emissions in the first place.

Guidelines do not set boundaries in my opinion for go/no-go decisions. This is the point that I am trying to make. I support better mitigation, but I see the same old basis for go/no-go decisions that we have used in the past-traditional economics and cost-benefit analysis. There seems to be little or no recognition that out there somewhere are environmental imperatives which are absolute. There are thresholds which we sometimes poorly understand and beyond which we should not tread. We proceed beyond those points at extreme peril. There will be absolute no's, "thou shalt nots." There are rivers we should not dam under any circumstances, there are forests that we should not cut under any circumstances, there are oil deposits that we should not exploit under any circumstances and there are mineral deposits the same way.

It is high time that some megaprojects were stopped on environmental grounds or because they are in conflict with our transition to sustainability instead of simply mitigated. Guidelines and a preoccupation with a mitigation approach, however well-meant and desirable, fall short of enabling us to make go/no-go decisions. What we need, with full public discussion and consultation, is to begin to define the conditions or criteria which will determine when we must say "no," under no circumstances and not with any amount of mitigation will we proceed with particular kinds of projects. We must develop criteria that will be the basis for the go/no-go decisions in future.

Perhaps this is the greatest challenge facing us all; in short, we have to learn how to limit growth that is not sustainable. So, ladies and gentlemen, what I am talking about is a revolution, but unlike revolutions of the past, it will be a positive, creative revolution that will do much to ensure the future of our species on this, our planet. To achieve this revolution will require an enormous amount of creative thinking and perhaps most of all, it will require much education and understanding across the country. As Senator Michael Kirby said at a recent conference on Ontario's energy choices, "The average Ontarian wants ownership of a detached home equipped with every conceivable electrical appliance including a heated pool, at the same time he will not tolerate an electrical system that is out for more than one hour a year, and he is not keen on new power plants at all whether they are hydro, coal, or nuclear. He will not accept that the environment must be destroyed if we are to achieve and maintain this standard of living." Instead, we believe we are entitled, as a right, to a clean environment, as well as a high standard of living. The inconsistency, indeed the deep conflict, revealed by these contrasting and unrealistic views will truly require a revolution in human values and human understanding and yet this is the challenge the we face, ladies and gentlemen.

In a way I think that you, the people that you represent and the people who you are, are the most appropriate people to take on this challenge and tell it the way it is. People such as you and I can speak out, we have no penalty to pay, and most of all, for most of us our future is not dependent on votes. Pity the poor politician, who even now, is beginning to have some understanding of the hard choices and trade-offs that have to be resolved. Any politician, with eyes fixed firmly on the short term until the next election and on telling us what we want to hear in the blandest, most innocuous and non-threatening terms, faces a daunting task in trying to lead us in this future direction and yet in this direction we simply must go. Politicians need the help of groups such as this today, of you and of me, if we have any hope of being successful in this new adventure and yet we must be successful. The price of failure is too serious to contemplate.

In closing, I would like to say to B. C. Hydro; you have certainly come a long way, Baby - but you still have some way to go. Thank you very much.

Don Swoboda:

Thank you Dr. Chant, the first question I would like to pose is, "Could you please speak to alternate methods for toxic waste disposal other than incineration, for example, waste exchange, three M-type reduction plans, chemical neutralization. What percentage of toxic waste is actually incinerable? Wouldn't it be advisable to implement waste exchange reduction and chemical reduction before building incinerators?"

Donald Chant:

No question about that. Thirty percent of the industrial waste in Ontario is organic and therefore amenable to incineration. Seventy percent is inorganic and not amenable to incineration. Of course, I think in everybody's lexicon the four R's of waste recovery, reduction, reuse and recycling are the preferred approaches, the top priority approaches. Unfortunately, a lot of people think that those four R's will make waste go away and will solve the waste problem. What they do is tend to turn the waste problem into a different sort of a problem. Increasingly, we have to deal with the residuals from recycling, often in a highly concentrated even more toxic form. Once you have run through these other priorities with treatment and disposal, destruction and disposal, then you incinerate. In my view, high temperature incineration through a rotary kiln, is absolutely essential as a major component of any waste treatment and disposal facility after you have run through the opportunities for reuse, recycling, recovery, and reduction.

Don Swoboda:

"Do you feel the hydrogen economy is feasible? What trends do you see in the near future for hydrogen based energy systems?"

Donald Chant:

I cannot comment on that. I should have said at the beginning that I am not an expert in many of the technical aspects of energy production, so I really cannot comment on that.

Don Swoboda:

One final one, "Burning garbage is a disincentive to recycling and the use of resources. How can you possibly equate it with conservation plus environmental awareness?"

Donald Chant:

I do not think there is any single answer to our waste problems whether industrial, domestic or any other kind of waste. Too often, people are thinking in terms of black and white, it is either this or it's that. You either recycle or you just helplessly allow yourself to burn all the wastes that happen to come in your direction in a rotary kiln. We have to think in terms of systems for dealing with these problems, very complex systems with many interrelated components. Yes, there are some circumstances where I feel we can and should burn garbage, especially if we utilize the energy that is produced. There are several hospitals now that are heated entirely from burning local garbage.

There are other kinds of garbage, of course, that we should not be burning, we should not be burying, we should be recovering the resources that it contains. I do not know if you have a blue box program in Vancouver. I have not driven around the urban areas on this trip. We instituted one in Toronto last fall, every family gets a blue box and you are told what you should be putting into that blue box and it is picked up once a week, curb side. Bottles and cans, are okay, but do not put ceramics in, you can put newspapers in a separate container, no slick magazines because they do not recycle, no magazines that are held together with glue on the backing because they do not recycle. It has been in service eight months, I guess, and it is a wonderful success. It has become, as it has in many other communities, almost an element of prestige. If you drive down the street and a house does not have its blue box out it is like it used to be if the family was seen not going to church on Sunday. There is something wrong with you and your neighbours will make you shape up.

## Thanks to Dr. Donald Chant by Conference Chairman Don Swoboda:

Thank you very much Donald. I would like to call upon Larry Bell to thank the speaker and to provide some closing remarks. Larry.

# QUESTIONS DIRECTED TO DR. DONALD CHANT ANSWERED AFTER THE FORUM

Question:

"What is the basis of wealth which will sustain growth in health care?"

Question by: B. Ranson

Donald Chant:

Well, you know I'm a biologist, not an economist. Health care is paid for as a service industry that we citizens fund in one way or another. And it's a growing share of our taxes and salary deductions. We all want the best in health care and the best is very expensive. As our population ages, all across the world health care expenses are going to shoot up. But if we want it, we can pay for it. It has to come from our national savings and wealth accumulation each year; there's no other source.

Question:

"What information is available on hydrogen as a fuel?"

Donald Chant:

There is considerable information available on the use of hydrogen as a fuel. Sources include the following:

1) B. C. Hydro Information Centre
970 Burrard Street
Vancouver, B. C.
V6Z 1Y3

2) Hydrogen Industry Council
1801 Avenue McGill College
Bureau 920
Montreal, Quebec
H3A 2N4

3) National Research Council of Canada
Publication Sales and Distribution Office
Ottawa, Ontario
K1A 0R6

Question:

"Garbage was mentioned as a possible source of fuel for electric power. Has any consideration been given to sewage as a possible source of power generation in B. C.? Los Angeles has a system built by Foster Wheeler."

Donald Chant:

Such systems are more in the realm of waste disposal systems instead of power generation systems. There is little net energy because of the low heating value of the fuel. Therefore, installation of this type of facility would be the responsibility of the local government. In some jurisdictions, sewage sludge is being incinerated with municipal solid waste (MSW) to dispose of it. Methane gas is being obtained from sewage sludge in North Vancouver.

Question:

"What will sustainable development mean to me as a citizen of B. C.? Is it meant to be an ethical attitude?"

Donald Chant:

Sustainable development is an admirable goal which we must all strive to achieve. However, in the near term, we will continue to use nonrenewable resources and try to develop acceptable alternatives for these nonrenewable resources as they are depleted. We should try to maintain a satisfactory quality of life while allowing underdeveloped countries and future generations to enjoy a satisfactory quality of life. To be practical, it seems unlikely that people in developed countries would accept a significant decrease in their quality of life in order to improve the quality of life for people in developing countries or future generations. Therefore, it will be necessary to employ new technologies to improve the quality of life.

Question:

"Could B. C. Hydro calculate a typical kW/ft$^2$ number and present that in historical graphical form at the bottom of each bill they send out for residential and general service customers? This would encourage interest in the Power Smart program."

Donald Chant:

To provide an estimate of kW/ft$^2$, B. C. Hydro would require the dimensions of your residence or business or would have to collect data from many residences and businesses and provide this as sample mean kW/ft$^2$. A more meaningful method is for you to compare your electricity demand for the same period in each year. There will be differences from year to year because of weather and the addition or deletion of new appliances, but you can allow for that. Try to compete with yourself by reducing your demand by using electricity wisely.

Question:

"Should there be an increase in rates to those areas of the province which require more costly underground services versus areas which are content with less costly overhead systems?"

Donald Chant:

Customers receiving underground service pay the extra capital cost at the time the service is installed. Once installed, underground services are generally less costly to maintain.

Question:

"Why is B. C. Hydro pursuing the development of thermal power options when the most serious global crisis we face is the greenhouse warming effect?"

Donald Chant:

B. C. Hydro is reviewing all of its options for supplying electricity to its customers. The impacts of these options including the greenhouse effect will be considered in evaluating these options.

Question:

"Why is B. C. Hydro prioritizing Municipal Solid Waste (MSW) as a fuel source when MSW contains the largest amount of contaminants such as CFCs (chlorinated fluorocarbons), heavy metals, chlor- organics, dioxins, furans and so on, which present a greater threat to the environment than any of the other power sources under consideration?"

Donald Chant:

MSW is part of an overall waste disposal problem. The best method of reducing the problem is to reduce the production of waste by eliminating such things as unnecessary packaging. Somewhat less desirable is recycling which permits re-use of materials with the cooperation of the consumer and/or resource recovery plants. Incineration is necessary as the next alternative because of the mounting problem of MSW and the lack of suitable landfills. If we must incinerate, it makes sense to try to use the energy from the incineration process.

Question:

"Is B. C. Hydro aware that EMSW (energy from municipal solid waste) undermines recycling programs and comes in conflict with the reduce, reuse and recycling agendas (the three Rs) that the public is pursuing?"

Donald Chant:

The Greater Vancouver Regional District is beginning its recycling program and we all hope that programs such as this are unqualified successes. Ideally, only the combustibles that cannot be reused or recycled should be incinerated. However, despite the reduction in MSW which results from such programs, there will be a great deal left which is impractical to reuse or recycle.

Question:

"Re: Hat Creek - Are you seriously considering this charcoal as a fuel? Are you aware of this activated charcoal's potential as an "Environmental Protection Product (EPP)? Are you open to offers to develop this resource in this capacity (as an EPP)?"

Donald Chant:

Hat Creek coal is not a natural charcoal, although it can be used as a substitute for activated charcoal for some applications. The Hat Creek coal deposits contain approximately 5.5 billion tonnes of mineable coal which ranks between sub-bituminous B and lignite A. The properties of Hat Creek coal as an "Environmental Protection Product" are comparable to other coals of this rank, so only local markets would be open to this product and the tonnage required would not be significant relative to the size of the deposits. B. C. Hydro has provided a number of customers with samples of this coal for testing as an "Environmental Protection Product".

# Closing Remarks

**Larry Bell**

**Chairman and Chief Executive Officer**

**B.C.Hydro**

# CLOSING REMARKS - MR. LARRY BELL

Ladies and gentlemen, first of all, before I make my concluding comments, I would like to thank Donald very much. He is a very brave man. He agreed to be the last speaker but one, after two and a half days; and indeed to have come all the way from Ontario to do it. So I think that he deserves an extraordinary round of applause from us, and a thanks for a very engaging review of the issues that face us right through to the next century. Thank you very much, Donald.

Well I got the short straw. I am the last speaker and the afternoon is getting on; a special thanks, to you, ladies and gentlemen, for joining here the last two and a half days and sharing your views with us. My remarks will be personal comments, and you will realize that were not written prior to this conference. Let me comment on four or five things that struck me during the Forum. I will try to be mercifully short.

First of all, a lot of talk about information; the 20 Year Plan summary report that you were given is a distillation of this Resource Plan which is 60 pages long. In turn, it is a distillation of about two feet of material. All of that is available in our library and we would be delighted if you would take some time and visit us for a week or so to wade through it. We talked a lot at this Forum regarding information and the need for open communication. But what we have to remember that, in a modern society, we have many demands on our time and a lot of them are demands with respect to understanding; with respect to communication; with respect to information. As our ability to absorb this material and to communicate it through the electronic media increases, we have an increasing obligation to involve ourselves in all the varied issues that impact on our life. So it is a worthy goal, but we have to be careful.

There is a very amusing but serious book that was written by an economist recently that was called 'The Theory of the Harried Leisure Class' and this was an early definition of the Yuppies. It seems it is not their money that is the constraint, it is finding time to shop. So while full information disclosure is an admirable goal, I think there are some limits. Nonetheless, what we heard today, what we heard from all of you, will renew our commitment with respect to communication. We will have an expectation as well that it is two-way communication; that message was there. But, in addition, it ought to be communication with respect to what you are for, as well as what you are against. So I place that obligation on you just as I place it on ourselves.

I am heartened by what we have agreed upon. We agree on the need for conservation, we agree on some of our soft options and we will press on with these. I hope that as we hold these Forums, and other Forums of a similar nature, that we can indeed add to that list of those things that we agree on in order that we can press ahead. We cannot wait for the perfect solution.

There was a lot of comment with respect to conservation and law; and it is an interesting debate that we ought to engage in, in a very serious way in our society. To what degree are we prepared to surrender individual freedoms for the common good? That is essentially what you are talking about when you are talking about legislation. I have a sense that through the 1990s and into the early 2000s that we have to deal with question of preservation for our environment and in fact, perhaps there is a basis of a social contract.

I was in charge of crown lands in this province some 10 or 12 years ago, and I remember thinking about my responsibility and thinking about all the varied pressures and the ad-hocery that when on. I finally put together a paper, and I said to the cabinet, "Look, we have to recognize that we are no longer the frontier. This is the last pass through our land base and we must, in fact, make some conscious decisions." That is a very very big psychological leap that we have to make as a society. We still have some romantic notions which we will not shed. If we take the land base of this province and we address the questions of economic development and preservation in their totality, we will have to surrender the concept of being the frontier.

Beyond that, the year 2010 plus, I think we have a greater opportunity to define the future. There was a lot of comment with respect to people wanting to be involved at the front-end. Can we get involved at start? Well, you are here today, and this is the start. It is not five years into the future that we must consider what is going to happen in the 2010; it is now. Because that is the kind of time scale that we are dealing with.

We started with Maurice Strong, and his very powerful message; all the way through this Forum, we discussed two dimensions which are well beyond the mandate of B. C. Hydro, well beyond our purview, in both time and space. Maurice talked about globalization. I just talked about the year 2010. We talked about inter-generational transfers and consumption trade-offs because we require these enormous lead times in order to be able to serve our projected energy requirements. We quite appropriately get caught up in a debate which is much broader, which is something that has to be tackled on a societal basis. We can be a participant as a Corporation, as a Crown Corporation, and as citizens; but it is presumptuous of us as a utility to take charge of what must be a global debate.

Let me talk about our responsibilities, our global responsibilities. To what degree are we really prepared to sacrifice some of our standard of living to let the Third World industrialize? Are we prepared to send money? Are we prepared to put less CO2 into the atmosphere? What are we prepared to do?

There was a lot of talk about exports. Well, interesting to think about that concept. Not in a global sense, not in the Amazon Jungle sense, which is an abstraction in which we can say, "We should not cut those trees down." Nonetheless, what they are trying to do down there is to stop their families from starving.

We have an ability to rationalize, to optimize the use of energy and energy resources, from the Mexican border to the Yukon. That is what that export policy is all about. Now we have not explained it well, that is a space dimension that we have to address. Many of you know many of the lead times that we have to deal with. Somebody suggested 50 years; well, we are nervous about next year, in terms of our ability to forecast.

One of the fundamentals people talked about is our role. Well, the essential ingredient of our role in B. C. Hydro is the obligation to serve. Who among you is prepared to one day go and turn on your light switch, and your lights do not go on? It is not because a tree fell on a line; it is because we just added the last customer and you are the last customer but one. Are you prepared to accept that? Are you prepared to have us come to you and tell you that you cannot consume anymore electricity at the rate that you are consuming it in your home, your pool, and your jacuzzi; and whatever else you have, will have to be taken out of that home immediately?

Well, that is not something we have been prepared to confront as a society, and maybe some of these challenges discussed at this Forum raise these kinds of questions. The poetry is fine, but those are the real issues in practical terms. So, while we have still the obligation to serve, we must forecast, we must put together plans, we must study options, we must be prepared if you as a society will not accept some of those consequences in order that we can serve you.

Jack Davis, the Minister of Energy, who is not only an engineer but an economist, suggested that we ought to use the pricing mechanism to control demand growth. We have amongst the lowest electricity rates in North America, and we know from our public opinion polls that rates are one of the most the sensitive issues vis-a-vis B. C. Hydro.

So we have a lot of thinking to do about some of these issues, and we will host a number of Forums where we can engage in that debate. But more - we will urge the broader views unto others who ought to be hosting, them. What are we going to do from here? Well, we are going to consider your detailed comments. Not only are we going to respond to your specific questions to the speakers, but I want to be able to synthesize what you told us during those workshops and to respond to your concerns.

I am a person whose attracted to doing things, and so I tried to make a little list of what we are going to do as a result of these two days. First of all, we will continue with the communication; we will continue to listen. We are going to press on with our corporate environmental guidelines and we are going to look for things - like an ability to give back. We talk about mitigation and compensation, but are we not at

B. C. Hydro also to think about the CO2 that we contribute through the automobile fleet that we run in this province? We should not look for something back with respect to addressing that as a corporation. We ought to look for ways in which we can recycle more of our wastes. We are not looking for anything back; that is our role as a good corporate citizen and we have an obligation to lead.

Secondly, I am more convinced than ever that we ought not to get dragged into the minutia of measuring social and environmental costs. I think we should paint broad brushes. I think we should try to reach consensus, and then add 25 or 50 percent. To the degree possible, we replace like with like. If we chop so many trees down and that represents so much fibre per year, let's go and replace it somewhere. Let's not drag that money into an accounting system where we cannot relate the events in the future when that expenditure ultimately takes place. We are going to push with even more vigor, the public education aspect of conservation. What we really need is a change in ethics, in beliefs, in values.

We have a Chief Engineer in B. C. Hydro and that person's responsibility is to ensure the technical integrity of what we do. But, I think there is room, not only for our employees to feel comfortable and to buy in to a set of guidelines, but in fact, perhaps, there is a role for somebody comparable to the Chief Engineer with respect to the Environment. Perhaps we need somebody who maintains our technical integrity in that regard. I talked about defining our role within the broader context of time and space and we may indeed do that; it may not be on a global scale, but rather in terms of the West Coast of North America. I think that is something we will try and think about for next year's Forum.

Finally, I would like to make the observation that at some point in time we have to make decisions and we have to press on. So while we plea for more flexibility, we plea for more communication; at some point in time the burden falls on somebody to make a decision and press on. Who is the decision maker? Well, it is conventional to be critical of politicians, but as someone who has worked for them for many years, I can tell you they are the unsung heroes of our society. Democracy works very well for us. All of us have to be tolerant of decisions made through the democratic process, even if we have difficulty agreeing with them because we cannot, through our actions, attack that institution. Ladies and Gentlemen, thank you very much for coming. I know that these two days have advanced my knowledge; I hope it has advanced our common understanding of one of the key public policy issues of this century and the next. Thank you very much.

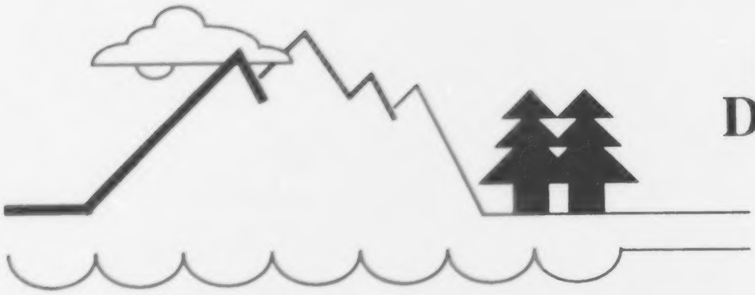
Don Swoboda:

In closing I would like to say thank you for coming, thank you for contributing, and a safe trip home, this Forum is adjourned.

# ELECTRIC ENERGY

## FORUM

## Energy and the Environment



## HANDOUTS DISTRIBUTED AT THE FORUM

# Second Annual Electric Energy Forum

Program
Vancouver Hotel, Vancouver

## Energy and the Environment

**Wednesday, May 10, 1989**

**Keynote Address and Reception**

6:00 - 6:45 pm **Registration - British Columbia Foyer**
6:45 - 7:00 **Official Opening and Introduction of Keynote Speaker - Columbia Room**
- Larry Bell, Chairman and Chief, Executive Officer, B.C.Hydro

7:00 - 8:00 **Keynote Address: Sustainable Development**
- Maurice Strong, Member of the U.N. World Commission on Environment and Development (1983 - 1987)

8:00 - 9:30 **Reception - British Room**

**Thursday, May 11, 1989**

**Session 1: Issues and Alternatives - Columbia Room**

8:00 - 8:30 am **Registration**
8:30 - 9:00 **Introductions**
- Larry Bell, Chairman and Chief Executive Officer, B.C.Hydro
- Don Swoboda, Vice-President of Production, B.C.Hydro - Forum Chairman

9:00 - 9:40 **Canadian Government Perspective**
- The Hon. Jake Epp, Federal Minister of Energy, Mines and Resources

9:40 - 10:00 **Coffee**
10:00 - 10:40 **Electricity as a Strategic Resource**
- The Hon. Jack Davis, Provincial Minister of Energy, Mines and Petroleum Resources

10:40 - 11:20 **Recognizing the Value of Water Resources**
- Peter Pearse, Chairman of the Public Inquiry on Federal Water Policy (1984-1985)

11:20 - 12:00 **U.S. Northwest Energy and Environmental Issues**
- Jim Jura, Administrator, Bonneville Power Administration

12:00 - 1:45 pm **Lunch - British Room**
Luncheon Speaker: Monte Hummel, President, World Wildlife Fund Canada
"Restrainable Development"

**Session 2: Future Development Scenarios - Columbia Room**

1:45 - 2:20 **B.C.Hydro's Environmental Guidelines**
- Chris Boatman, Vice President of Corporate and Environmental Affairs, B.C.Hydro

2:20 - 3:00 **Forecasts of Load, Generation and Transmission into the 21st Century**
- Ken Peterson, Manager of Policy and Planning, B.C.Hydro

3:00 - 3:30 **Coffee**

**Session 3: Public Participation - Locations to be announced**

3:30 - 5:30 **Simultaneous Workshops on Future Development Scenarios**
5:30 - 6:30 No Host Bar - British Columbia Foyer

# The Speakers

**Larry Bell**
B.C. Hydro

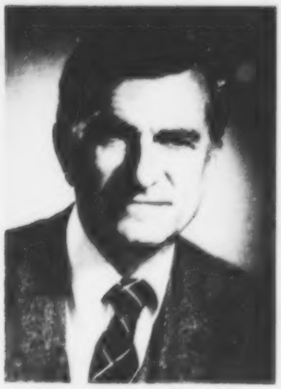
Larry Bell is the Chairman and Chief Executive Officer of B.C. Hydro. Mr. Bell draws on an extensive background in both the financial and public sector. Prior to his appointment to B.C. Hydro, he spent three years as C.E.O. of Vancouver City Savings Credit Union. In addition, Mr. Bell has served as the provincial Deputy Minister of Finance, Deputy Minister of Lands, Parks, and Housing and Deputy Minister responsible for Transit. He holds a bachelor's degree in economics and geography from the University of British Columbia and a master's degree in social science from San Jose State College, California. Currently, he is a board member of Montreal's Institute of Research on Public Policy, Vice-Chairman of the Vancouver Board of Trade, member of the Canadian National Committee World Energy Conference and General Campaign Chairman 1989 — Lower Mainland United Way.

Maurice Strong is Chairman of Strovest Holdings Inc., American Water Development Inc. and the Council for the World Economic Forum. He is also President of the World Federation of United Nations Associations and Better World Society, a member of the international advisory board of Unisys Corporation and a director of Consolidated Press Holdings.

Mr. Strong has held numerous positions including member of the World Commission on Environment and Development; Vice-Chairman and Director of the Societe Generale pour l'Energie et les Resources; Chairman of the International Energy Development Corporation; Executive Director of the United Nations Environment Program; Director of the Renewable Energy Institute; Director U.S.A. for Africa; Vice-President, Advisory Committee on Pollution of the Seas; Chairman, Bureau of the International Union for Conservation of Nature and Natural Resources; Vice-President and member of the Executive Council, World Wildlife Fund International; member of Council and Executive Committee, Society for International Development.

Mr. Strong has received numerous awards including the Order of Canada; Tyler Ecology Award; National Audobon Society Award; First International Pahlavi Environment Prize; Gold Environmental Leadership Decade Award, United Nations Environment Programme; Rene Dubos "Only One Earth" Award and Member, United Nations Environment Programme Global 500. He holds honourary degrees from 27 universities in Canada, the United States and Europe.

**Maurice Strong**
Strovest Holdings Inc.



**Don Swoboda**
B.C. Hydro

Don Swoboda is presently Vice-President of Production for B.C. Hydro. In 1958 Mr. Swoboda graduated in mechanical engineering from the University of British Columbia. He joined B.C. Electric upon graduation. Between 1963 and 1967 he worked for Pacific Gas and Electric and Geodex International before re-joining Hydro where he has held various positions in hydroelelctric, thermal and substation operations. Mr. Swoboda is a registered professional engineer in the Province of British Columbia.

**Jake Epp**
Federal Minister of
Energy, Mines and
Petroleum Resources

The Honourable Jake Epp is a member of the Cabinet Committees of Planning and Priorities, Cultural Affairs and National Identity, Economic Policy and Environment. Mr. Epp has been Minister of Indian and Northern Affairs and Minister of National Health and Welfare prior to his present appointment.

Mr. Epp has bachelor's degrees in Arts and Education. He was a teacher and active in community groups before entering politics.

**Jack Davis**
B.C. Minister of
Energy, Mines and
Petroleum Resources

The Honourable Jack Davis is an engineer, economist, former member of parliament and currently a minister in the B.C. Cabinet. Federally, he has served as Minister of Fisheries and Forestry and Minister of the Environment. Provincially, he has been Minister of Transportation and Communications as well as Minister of Energy before being appointed to his present position. Dr. Davis is on the Environment and Land Use Committee and other committees of the B.C. Cabinet. Chosen as Canada's Engineer of the Year in 1975, he was also a Rhodes Scholar and is the author of several books.

**Peter Pearse**
University of
British Columbia

Peter Pearse is a Professor of Economics and Forestry at the University of British Columbia. Dr. Pearse has been Commissioner of the Royal Commissions on the Forest Resources of British Columbia and Pacific Fisheries Policy and Chairman of the inquiries on Federal Water Policy and Canada's Freshwater Fisheries Policy. Dr. Pearse has published numerous research articles and books on government policy relating to management of renewable resources, particularly forests, fisheries and water resources. He has received several awards including the Canadian Forestry Achievement Award and Member of the Order of Canada.

**Jim Jura**
Bonneville Power
Administration

Jim Jura is Administrator for the Bonneville Power Administration (BPA). Mr. Jura received a bachelor's degree from the University of Washington and a master's degree in business administration from Seattle University. He worked for the Boeing Company, the Department of Labour and the Office of Management and Budget before joining BPA in 1978. He was appointed BPA's Administrator in 1986.

**Monte Hummel**
World Wildlife
Fund Canada

Monte Hummel is President of the World Wildlife Fund Canada. He also holds many other positions including member of the World Wildlife International Advisory Council; Executive Director of the Wildlife Toxicology Fund; member of the Executive Committee, Canadian Coalition on Acid Rain and the Canadian Council on Ecological Areas; member of the Natural Heritage League, Wildlife Habitat Canada, Canadian Joint Centre for Toxicology and the Canadian Acidic Precipitation Foundation; Director of the Arctic International Wildlife Range Society; and Associate of the Institute for Environmental Studies, University of Toronto.

Mr. Hummel was formerly a director of the Algonquin Wildlands League, Canadian Committee for the International Union for the Conservation of Nature and Natural Resources and the National Survival Institute of Canada; member of the Committee on the Status of Endangered Wildlife in Canada and the Sanford Lake Wilderness Research Centre. He is also the author of numerous books and articles on the environment.

**Chris Boatman**
B.C. Hydro

Chris Boatman is the Vice-President of Corporate and Environmental Affairs and Executive Assistant to the Chairman of B.C. Hydro. In 1984, Mr. Boatman was appointed Manager of B.C. Hydro International Ltd., a subsidiary company of B.C. Hydro involved in offshore consulting services. In this capacity he worked on research projects and hydroelectric projects in the People's Republic of China and sat on the board of CIPM Yangtze Joint Venture, a consortium of Canadian consulting companies involved in the Yangtze River Development. In 1986, Mr. Boatman joined the Office of the Chairman and C.E.O. as Executive Assistant to the Chairman and President and in 1988 he was appointed President and C.E.O. of the British Columbia Power Export Corporation (POWEREX), an agency to coordinate the export of power from British Columbia. Mr. Boatman graduated from the University of London in 1963 with a degree in civil and structural engineering.

**Ken Peterson**
B.C. Hydro

Ken Peterson has been with B.C. Hydro since 1977 and is presently the Manager for Policy and Planning. His responsibilities as head of this department include rate design and administration, load forecasting, resource planning and policy analysis. Mr. Peterson has extensive experience in economic evaluation and policy analysis of major issues such as long term electricity export, flexible supply planning, and discount electricity rates to promote investment and employment. He received his master's degree in economics at Northwestern University following a bachelor's degree in economics from U.B.C. He has also worked with the Westwater Research Centre at U.B.C.

**Carole Burnham**
Ontario Hydro

Carole Burnham is Director of Environment for Ontario Hydro. She has a bachelor's degree in chemical engineering and a doctorate in physical chemistry from McGill University. Dr. Burnham worked for 10 years in the private sector, primarily in environmental management, before joining Ontario Hydro in 1976. With Ontario Hydro she has worked on fusion technology, PCBs and other environmental issues. In her present position, Dr. Burnham is responsible for developing and recommending environmental policies, advising on emerging environmental issues, coordinating and integrating environmental activities and serving as an advocate on environmental issues.

**Bruce Strachan**
B.C. Minister of
Environment

The Honourable Bruce Strachan is B.C.'s Minister of Environment and Minister of State for Cariboo. Mr. Strachan graduated in Arts and Science from the College of New Caledonia. He served in municipal politics in Prince George, B.C. before being elected to the Legislative Assembly in 1979. Mr. Strachan is currently Chairman of the Environment and Land Use Committee and a member of the Regional Development, Legislation and Regulations and Native Affairs committees of Cabinet.

**Bob Crockett**
B.C. Hydro

Bob Crockett is Manager of Marketing at B.C. Hydro. Mr. Crockett graduated in economics from the University of Alberta in 1976. He held various production and marketing positions with Procter and Gamble, International Playtex and Nabob Foods before joining Hydro in 1988.

**Wayne Morgan**
B.C. Hydro

Mr. Wayne Morgan is currently B.C. Hydro's Manager of Power Contracts, in charge of evaluating proposals from Independent Power Producers to supply electrical energy to B.C. Hydro. Mr. Morgan was appointed Manager of Power Contracts in September 1988.

In previous appointments at B.C. Hydro, Mr. Morgan was Manager of the Lower Mainland Division; Manager, Distribution Department, Lower Mainland Division; and Electrical Superintendent, Kitchener Operations Centre.

Mr. Morgan graduated in Electrical Engineering from the University of British Columbia in 1962. He obtained a Masters of Business Administration from the University of Western Ontario in 1970.

Donald Chant is Chairman and President of the Ontario Waste Management Corporation which is responsible for creating a toxic waste management system for the province. Dr. Chant has also been the Chairman of the Wildlife Toxicology Program funded by Environment Canada and the World Wildlife Fund, and member of the National Task Force on Environment and Economy, Science Advisory Board of the International Joint Commission on Great Lakes Water Quality and the Executive Committee of the World Wildlife Fund Canada.

He was formerly a member of the National Committee on Pesticide Use in Agriculture, President and Chairman of the Pollution Probe Foundation, Chairman of the Workshop on Environmental Law for the Canada Department of Environment and Fisheries and the Steering Committee on drafting regulations for the Environment Assessment Act (Ontario), Canadian Co-Chairman of the Joint U.S. National Academy of Science/Royal Society of Canada Study on Acid Precipitation. He was a member of the Canadian Environmental Law Research Foundation, Canadian Environmental Advisory Council, Environmental Assessment Board (Ontario) and Conservation Council of Ontario.

Dr. Chant received his bachelor's and master's degrees from the University of British Columbia and his doctorate from the University of London. He has held various positions with the Canada Department of Agriculture as well as academic positions with universities in Canada and the United States. Dr. Chant is the author of many papers and books on entomology, forestry and environmental matters. He has received numerous awards and honourary degrees including Office of the Order of Canada, the White Owl Conservation Award and the Distinguished Public Service Award (Federation of Ontario Naturalists).

**Donald Chant**
Ontario Waste
Management Corporation

# Participant Briefing Package

This package contains background information
useful to participants of the

# Second Annual Electric Energy Forum

## Energy and the Environment

sponsored by

B.C. Hydro
B.C. Ministry of Energy, Mines and Petroleum Resources
B.C. Ministry of Environment

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  how can we meet the need?
  how do we evaluate alternatives?

**Project Planning**.................................................. 12
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  types of impacts
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# Energy and The Environment

The purpose of the forum is to focus on energy demand and supply within the context of environmental resources and sustainable development. This theme reflects B.C. Hydro's determination to integrate environmental issues in current and future resource planning. Hydro is determined to take a position of leadership in its corporate responsibility towards the environment.

## Sustainable Development

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This definition comes from the United Nations World Commission on Environment and Development. It provides the context for B.C. Hydro's mandate of supplying energy and its resolution to act responsibly towards the environment. Sustainable development is a challenge for all resource users.

## Who is "B.C. Hydro" ?

B.C. Hydro is the major supplier of electricity in British Columbia. It is owned by the Provincial Government, and is Canada's third largest electric utility. B.C. has the fortunate combination of climate and topography which enables Hydro to supply most of the electricity from hydroelectric generation.

## B.C. Hydro's Environmental Guidelines

B.C. Hydro, in fulfilling its provincial mandate to provide an efficient supply of electricity, has a significant effect on the people, communities and natural resources of British Columbia. It is therefore of fundamental importance that Hydro assumes responsibility for energy development that is environmentally sound. The Corporation, through its Board of Directors, has passed the following resolution:

> **"In carrying out its business, B.C. Hydro will minimize adverse effects on the natural and social environment and actively pursue opportunities to manage these resources for the benefit of future generations."**

B.C. Hydro is committed to the spirit as well as the letter of this resolution. The resources of the province are the property of the people of the province. Resources are protected and used according to laws, regulations and guidelines established by all levels of government. Hydro is making a formal commitment to integrate a set of eight guidelines into all levels of Corporate decision-making. These guidelines apply to all phases of Hydro's business and provides direction for managing its affairs. It supports Hydro employees in keeping environmental responsibility uppermost in their minds in all their daily activities.

## Long Range and Project Planning

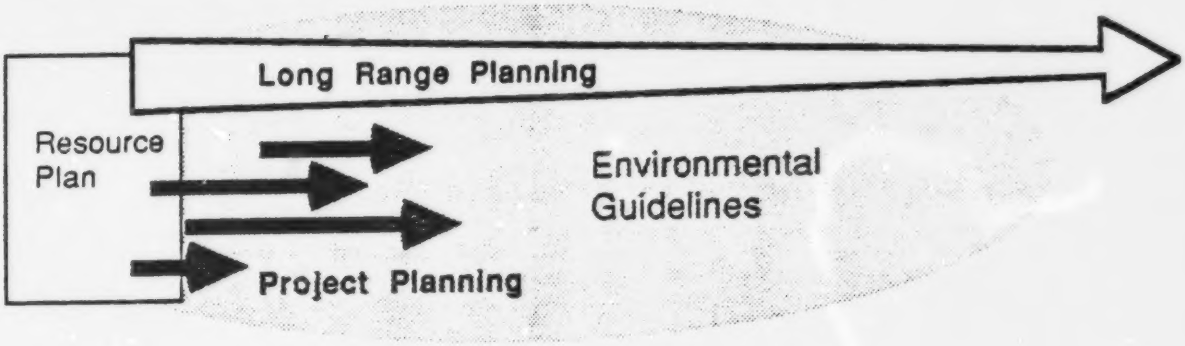
The environmental guidelines influence both long range planning and project planning. Long range planning is concerned with the big picture - the establishment of needs and values. Environmental policy helps establish the direction of long range plans. Project planning is concerned with the design, implementation and operation of specific projects. Environmental policy is especially useful in directing the management of environmental issues when specific actions are being considered.

### Long Range Planning

Long range planning addresses the questions of how much electricity do the people of B.C. want and how much of their resources they are willing to commit to energy production. A Resource Plan, prepared by B.C. Hydro, describes various ways that different levels of electrical energy requirements could be met. The implications of alternative scenarios are evaluated through consultation and analysis during the long range planning stage. Through this process a group of projects is chosen for more detailed study.

### Project Planning

For each project the impacts to the natural and social environment are considered; some impacts may be avoided entirely, others can be mitigated, and still others resolved through compensation. Detailed project planning may also reveal a different selection of projects which will better serve the needs of B.C. residents.



## Public Consultation

The forum is not about the public consultation program, it is a part of it. However, it is only a small part. B.C. Hydro is committed to an on-going process, and is structuring a program that will reach people throughout the province. You can have a say in how that process will evolve by presenting your suggestions at the forum.

Hydro is committed to participating with interested individuals, groups and organizations in addressing environmental concerns. This will apply to all phases of activities, both long range planning and project planning. This forum is intended to foster communication between various groups who are interested in and concerned about B.C.'s energy future and the environment. It is intended to promote understanding through presentations and discussions and to provide Hydro with meaningful input on the concerns of various groups. Hydro plans to expand its public consultation program and ideas received from the forum will help shape the nature of the program.

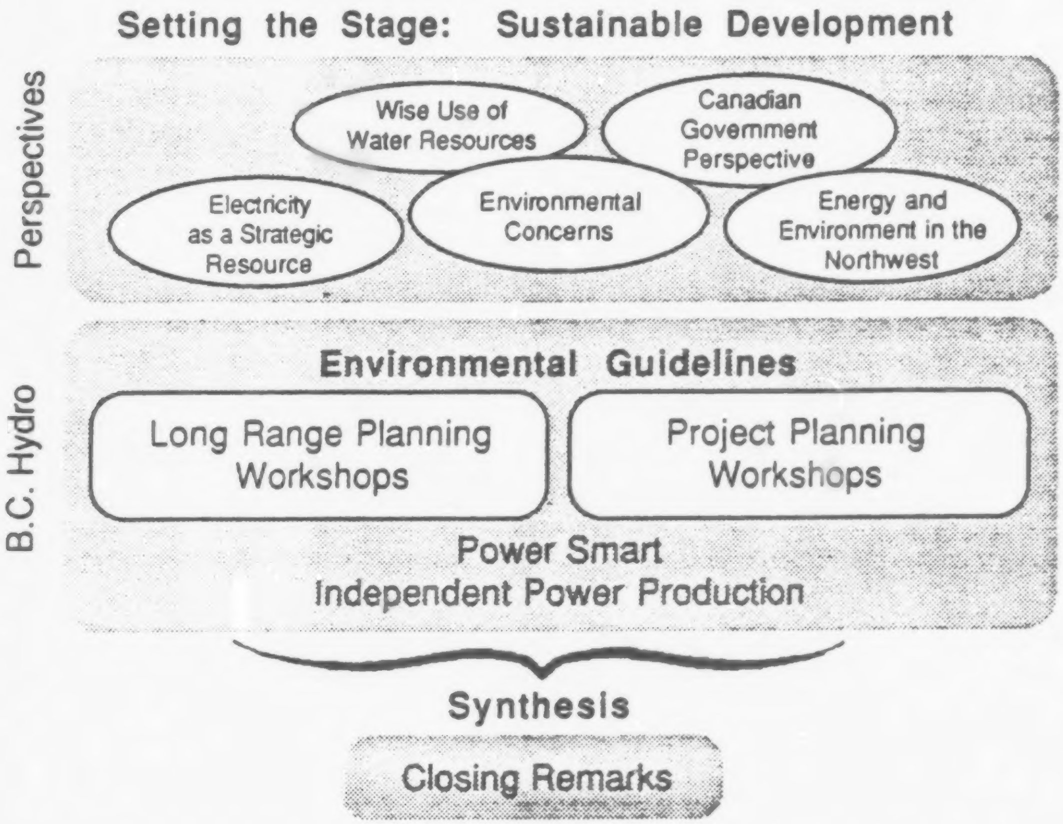
Discussion groups in the form of small round tables will be set up to enable everybody to participate. Results from each of these deliberations will be collected, synthesized and presented to participants at the end of the forum. Because time is limited, the focus will be on the issues where Hydro can act. If concerns arise that are in the domain of other organizations, forum facilitators will help identify who can deal with them.

# Forum Organization

## The Parts of the Forum

To set the stage, the forum will begin with a keynote address on sustainable development by Maurice Strong. The remainder of the forum is divided into two parts: the first provides a broad perspective through contributions from leading experts. It includes distinguished speakers on a selection of topics as shown in the figure below.

The second section focuses on B.C. Hydro. It begins with a discussion of Hydro's environmental resolution and how it applies to both long range and project planning. Both levels of planning will be addressed in two half-day workshops by a combination of presentations and round table discussions.



Setting the Stage: Sustainable Development
Perspectives
Wise Use of Water Resources
Canadian Government Perspective
Electricity as a Strategic Resource
Environmental Concerns
Energy and Environment in the Northwest
B.C. Hydro
Environmental Guidelines
Long Range Planning Workshops
Project Planning Workshops
Power Smart
Independent Power Production
Synthesis
Closing Remarks

After the workshops on long range and project planning there will be further presentations from Hydro on selected topics like Power Smart and Independent Power Production. During these presentations the workshop facilitators will summarize the results of workshop discussions and then present them to everybody in a plenary session. A final synthesis of the forum will be presented by Dr. Donald Chant, and the Chairman of B.C. Hydro, Larry Bell, will consider what comes next in his final remarks.

## Workshop Organization

In order to make this interactive forum work, people will be assigned to discussion tables in each workshop. You will receive these assignments along with your registration package. The table assignments will be based on the requests you made upon registration. We will try to have different perspectives, industry, government and environment, included at each table of eight to 10 people.

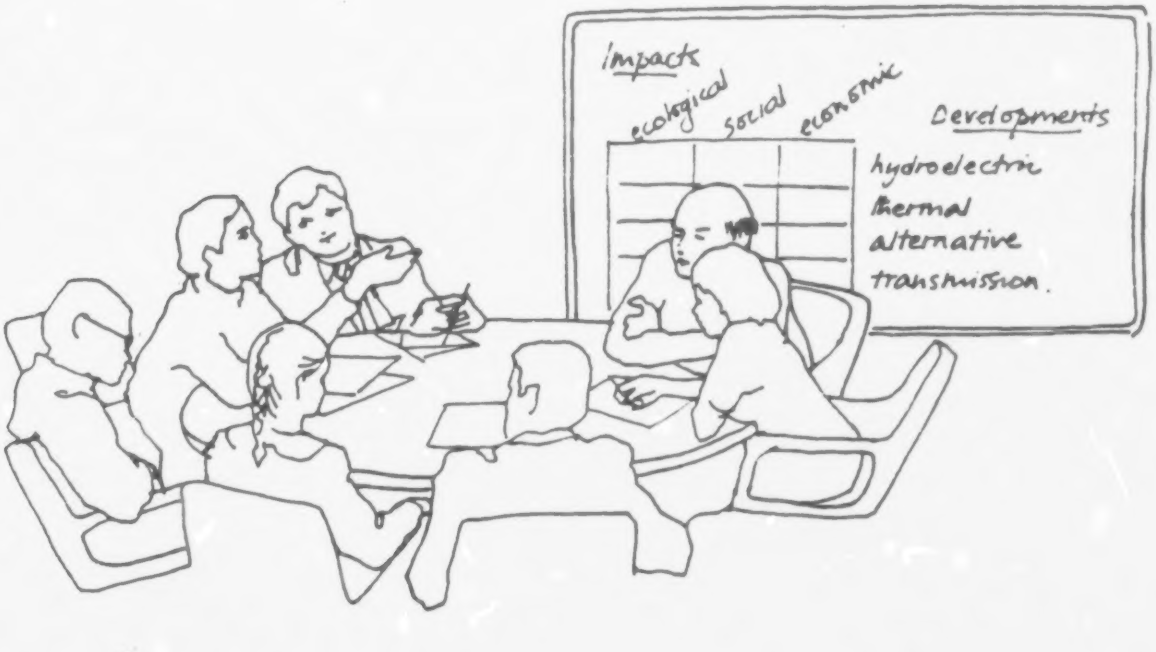
Discussions will take place in six separate rooms. During the long range planning workshop on Thursday afternoon, each roomful of participants will engage in similar issues. This will include our future energy needs and the choices we can make to fulfill those needs. The role of public consultation in long range planning will be discussed with emphasis on the objectives, the players, the difficulties and the means for improvement.

Project planning will be discussed on Friday morning. There will be four different topics: hydro, thermal, alternate power production and transmission - but still six different discussion rooms. That means that more than one roomful of participants will engage in the more popular topics. The first pamphlet advertising the forum also listed public participation and environmental assessment as workshop topics. Since these topics are about processes that concern all of the hydro activities, they will be discussed in each workshop.

## Round Table Discussions

Each of the six workshops will have a professional facilitator to ensure discussion proceeds smoothly. Each table within each workshop will also have an assigned "leader" who will be in charge of moving the participants through the topics without regimenting or stifling discussion. Each table will also have a "recorder", a person from B.C. Hydro, who will be responsible for recording people's comments.

Specific questions will be set up in order to focus the discussion. Everybody will be asked to express their ideas to the group. After everyone has had a chance to speak, the table will select key ideas and identify priorities. Forms will be provided for recording these ideas. Ideas that arise, but don't follow the format of the questions and recording forms, will also be recorded. This procedure will help the forum facilitators synthesize and summarize the results of discussions from about 40 separate tables. A first cut of this synthesis will be presented at the forum, and a more extensive written summary will be published with the proceedings which will be distributed to all participants.



# Long Range Planning

## How much electrical power will we need?

It is always difficult to predict how people will behave in the future - there are so many different factors which determine the choices that individuals make and thus the direction that the economy moves. Traditionally forecasts are based on the projection of past trends, but we have learned that unexpected events, such as the recession of the early 80's, can change the course of trends. Furthermore, as we become more aware of the effects of corporate and individual choices, we start to shape the future in a more deliberate way. For example, increasing environmental awareness and concern for sustainable development is shaping current actions and thus the future.

But in order to function in a modern society we need electricity. Electrical utilities are faced with having to predict needs without overdeveloping. B.C. Hydro is no exception. In the 1970's it recognized that the long term forecasts were too high and its response was to scale down development dramatically. Now we see a strong economic recovery - 1988 was the third consecutive year in which demands exceeded projections for the Hydro system. The electrical power needs over the next decade are almost certainly going to increase beyond current supplies. The question is how much?

## How can we evaluate alternatives?

Our society requires power. This becomes abundantly clear whenever there is a disruption in the supply; people demand a reliable energy supply at a reasonable price. Power requires resources. It comes right back to sustainable development; using our resources in a way that meets the needs of the present without compromising the future. In order to make sure that we provide for future generations we have to recognize what impacts our current choice will have on future resources.

There are several issues to consider. Ecological and social systems are interconnected locally, regionally and even globally. A development is influenced by other events, some quite distant, and it has social and environmental impacts. Direct effects are fairly obvious, but indirect effects are much more subtle and much more difficult to understand or predict.

To further complicate the issue of impacts, the negative effects are not always felt by the same people who benefit. When is it appropriate to disadvantage a few so that many may benefit? On the other side of the coin are similar questions about the impacts of not going ahead with energy development. Who benefits, who pays? It is difficult to understand all the repercussions as people make alternate choices that put different demands on ecological and social systems.

Another issue is the economic viability of development. Economic risks are associated with making the wrong development choices. The wrong choices could result in under or overcapitalization, cost overruns and regulatory delays. Unpredictable changes in inflation rates and technology further complicate the matter. Energy utilities are very sensitive to overall economic activity - everybody uses energy.

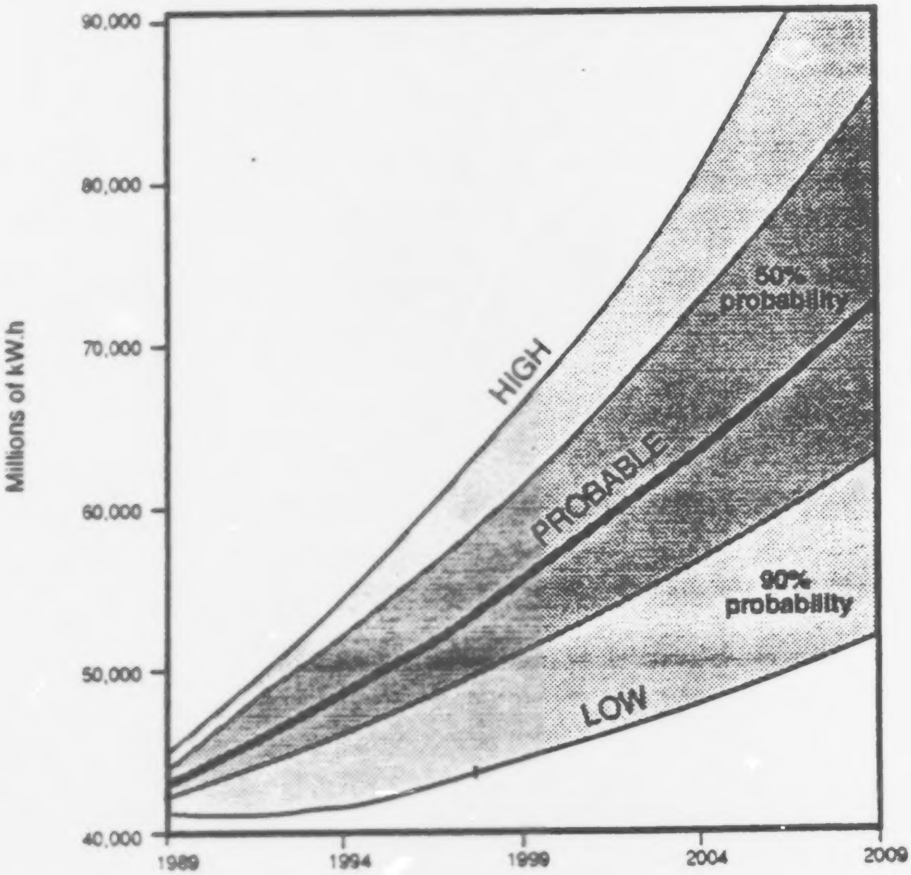
These are difficult issues to resolve. Public consultation and government regulation play a role in the process of making choices. So does B.C. Hydro through its mandate to supply electricity and its environmental guidelines. Since Hydro is responsible for supplying electrical power, it is taking a proactive role in coordinating the selection process.

## Demand Forecasts

Any forecast has to start with a series of assumptions. In order to forecast probable energy demand up to the year 2009, B.C. Hydro has assumed:

- Economic growth of 3% per year up to 1998, then slowed to 2.8% real annual growth
- Population growth of 1.4%
- Real energy price declines by 1.5% to 1998, for a total of 14% reduction

Together these assumptions imply 55,290 GWh by the year 1998 (see graph). Of course uncertainty is associated with these numbers. The uncertainty is expressed by bands which describe the probable range of the future energy requirements.



Range of Forecast Demands

## How can we meet the energy needs?

Once we have decided how much power will likely be required, we can ask where it is going to come from. There are several avenues open to the people of B.C. - we have a variety of potential electrical energy resources. To help compare projects B.C. Hydro classifies demand-side management (programs to enable more efficient use of electrical energy) as "energy resources". Other resources include small scale production by independent power producers and the upgrading or development of electrical generation projects. All projects aimed at finding alternatives to the traditional choice of new construction are grouped under the "Power Smart" initiative.

### Power Smart Customer Programs

These customer oriented programs encourage the efficient use of electricity with the intent of reducing "load growth". They are an example of demand-side management. More efficient use means that future energy requirements will not increase as fast as they might otherwise and the need for new energy developments is reduced. Also, residential, commercial, and industrial energy users have another incentive, the possibility of lower electricity bills.

In implementing Power Smart customer programs Hydro will start with new purchases of energy saving equipment because it provides the longest lasting effect at the smallest cost. Renovation and replacement of buildings and equipment will come next, and then programs intended to change attitudes and preferences in ways that will result in less energy use.

B.C. Hydro is investing $225 million over the next 10 years in customer programs. The present goal is an annual energy saving of 3000 GWh within 20 years.

### Improvements to Existing Facilities

The other half of energy efficiency is efficient production. Improvements are planned to make existing facilities more efficient and thus obtain significant additional energy from the B.C. Hydro system. This also will allow postponement of new generation facilities.

Additional energy may also be obtained from existing plants by installing additional equipment, like turbines, thereby making more effective use of available water resources. Approximately 2000 GWh of improvements are estimated in the 1989 Resource plan.

### Coordination and Purchases

A number of coordination and purchase agreements with neighbouring utilities and a large industrial firm offer a potentially attractive combination of flexibility and fairly priced energy. For example, because the Alberta Interconnected System is largely thermal, it can offer substantial power during off-peak periods. Generation based on hydro power, as in B.C., has high peak generating capacity and can "save" the energy in the form of water behind the dam when it is not needed. Similarly, coordination with the Bonneville Power Administration and Alcan could lead to more effective power production.

### Independent Power Producers

Independent or privately owned electrical generation facilities can be connected to the B.C. Hydro system for the purpose of selling electricity. Independent power producers can often generate small amounts of electricity more cost effectively than Hydro could. This includes the sale of surplus energy from industries that generate electricity for their own use (self-generation) or industries that can produce electricity along with their normal process (cogeneration). About 1400 GWh could be supplied through cogeneration. Industries that produce their own electricity also free up existing production capacity for other users. This is known as load displacement.

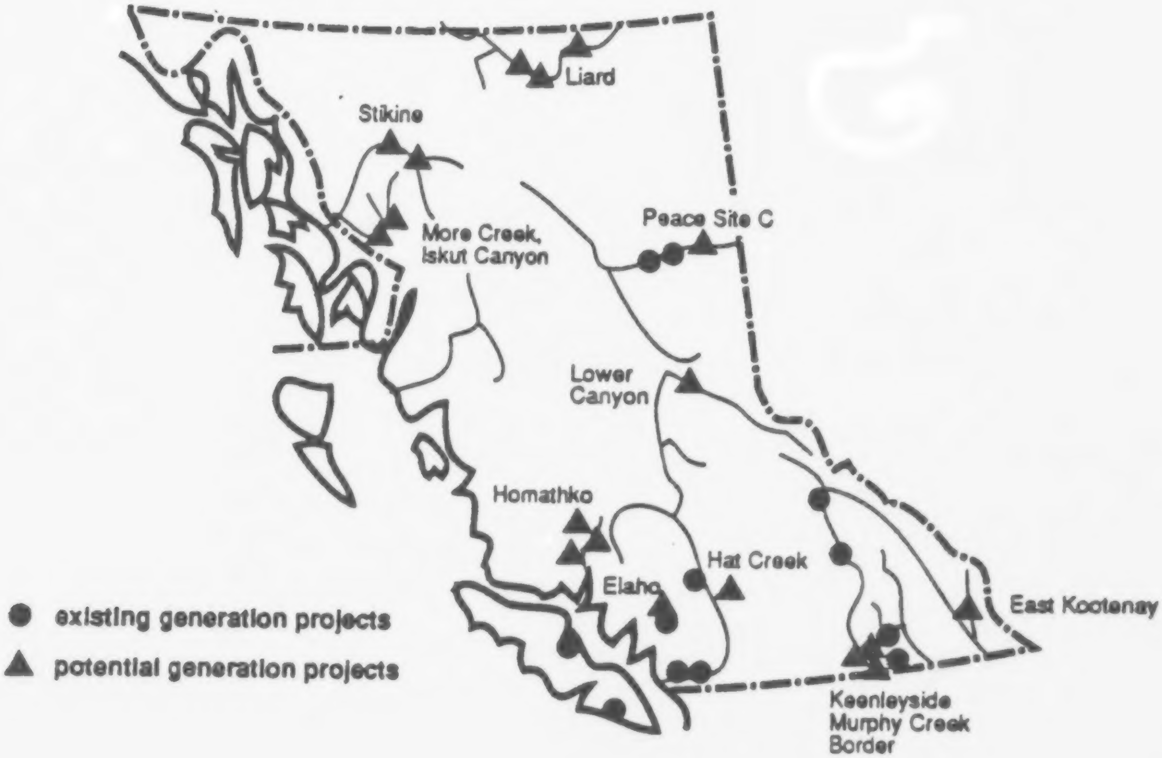
Alternative energy sources such as small hydro, biomass (wood waste) and wind resources offer potential for grid customers and remote communities currently being served by diesel generation.

## Downstream Benefits from the Columbia River Treaty

Under the Columbia River Treaty, Canadians are entitled to downstream power benefits from the Duncan, Keenleyside and Mica projects. These benefits were sold to the United States for a limited time and will now revert back to British Columbia beginning in 1998. The benefit we can expect depends on several factors built into the treaty, the most significant of which is the rate of electric load growth and types of resources used in the northwestern states.

## Potential New Generation Projects

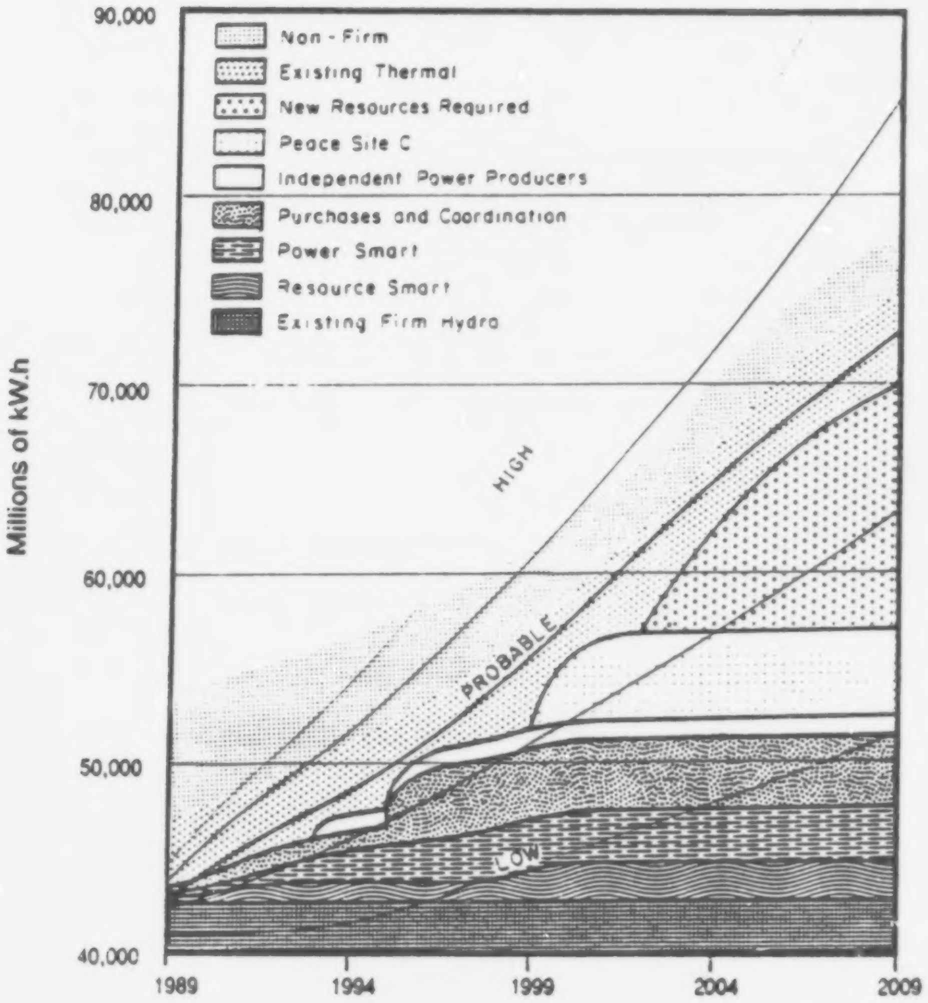
B.C. has an inventory of possible electrical generation projects. These vary in feasibility because of physical configuration, location, environmental impacts, and social acceptability. A few potential projects are identified on the map below. Project level planning will be required to further clarify the concerns and options.


Liard
Stikine
More Creek, Iskut Canyon
Peace Site C
Lower Canyon
Homathko
Hat Creek
Elaho
East Kootenay
Keenleyside
Murphy Creek
Border
● existing generation projects
▲ potential generation projects

## Supply Scenarios (Resource Scheduling)

As described in the previous section, there are many ways to meet our energy needs. In fact all of the projects together would provide more than we need in the near future, so the objective is to select the most effective combination to give us the energy we need when we need it. Various combinations of projects are called supply scenarios, or "resource schedules". Many different combinations have been developed and compared. Three of these will be presented at the forum. The final choice between these three or other combinations will evolve through extensive analysis and consultation.

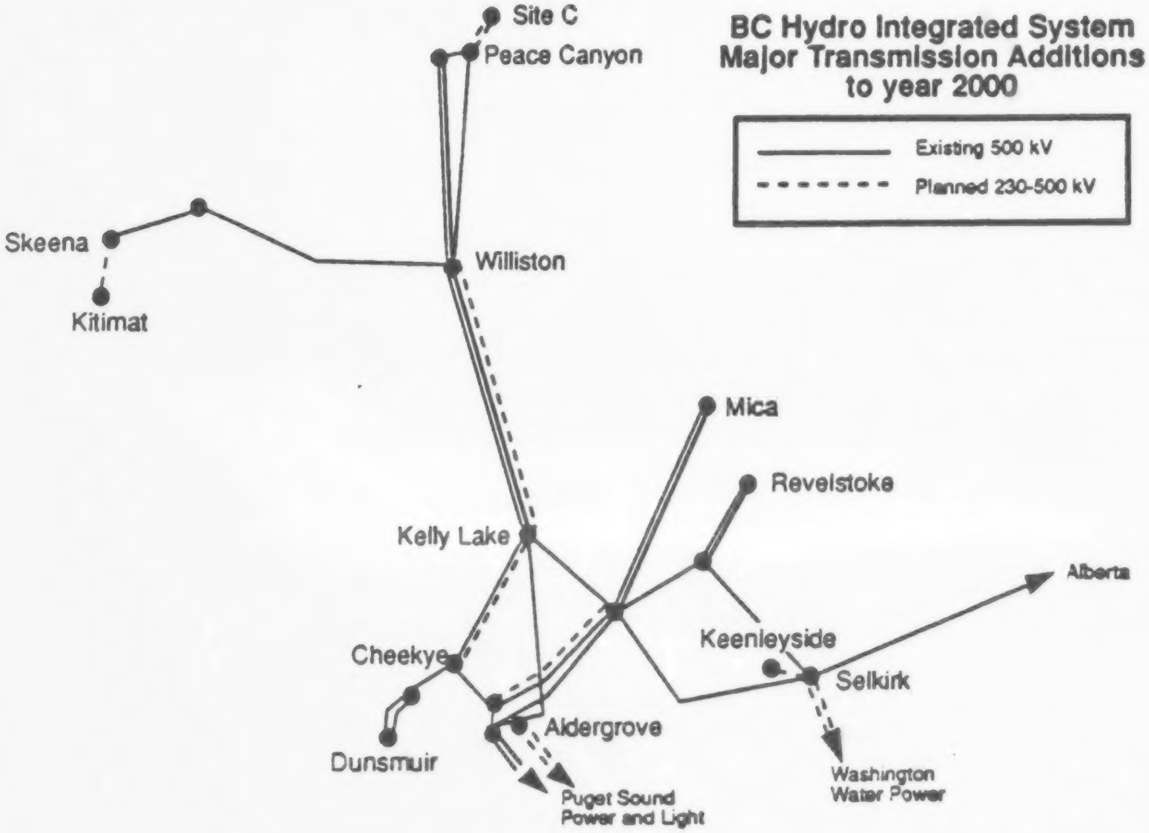
One scenario is graphically presented in the following figure. The range of demand projections is shown as before. The sources of supply are stacked on top of each other as they come on-line over time and hopefully there will be just enough supply to meet the demand. Some of the supply is flexible, such as the supply from existing thermal facilities. Thermal facilities need not be active, but can be activated if demand rises faster than anticipated.



Sample Resource Plan
to Meet Range of Forecast Demands

## Transmission Requirements of Supply Scenarios

Generating electricity at a plant is not enough; it must be delivered to the user. Thus transmission lines are important components of the B.C. Hydro electricity supply system. Not only is there a significant cost associated with transmission, but also transmission lines affect other resources. Many of the environmental impacts people are concerned with are related to energy transmission. We have to consider transmission as part of the overall package when we evaluate alternative supply scenarios. The following figure shows both the major existing transmission lines and the major additions required for the resource schedule described in the previous section.


BC Hydro Integrated System
Major Transmission Additions
to year 2000

Existing 500 kV
Planned 230-500 kV
Site C
Peace Canyon
Skeena
Kitimat
Williston
Mica
Revelstoke
Kelly Lake
Alberta
Keenleyside
Selkirk
Cheekye
Aldergrove
Dunsmuir
Puget Sound Power and Light
Washington Water Power

## Project Planning Horizons

If we want power from a specific project at a specific time, we have to plan ahead. Both project planning and construction take time. Construction time depends on the nature of the project; ten years is not unrealistic for a medium size hydro project. The more public consultation is involved, the longer the planning process takes and the further ahead we have to plan.

Because we will almost certainly need more electrical energy within the next decade, we have to start implementing some plans now. B.C. Hydro has already identified those that are obvious and less environmentally sensitive and has started action. Power Smart is under way. Other projects are proceeding to project planning.

The major choices that have to be made now are related to generation beyond the year **2000.** Public consultation is essential to making these choices, and it has to start now.

# Project Planning

Planning at the project level is in many ways much more manageable than long range planning. Not only are the issues more tangible, but we have more experience, understanding, and tools. That does not mean it is easy and the issues that need to be resolved do vary from project to project.

## Types of Projects

### Hydroelectric

Hydroelectric power has many advantages. For large scale production it is a low-cost alternative. B.C., where most of the power is supplied by hydroelectric plants, has one of the lowest energy costs in Canada - and in the world. Hydro is a mature technology. It uses a renewable resource (water), has no pollution or waste disposal problems, and it can store potential energy for later use in the form of water behind dams. The disadvantages of hydro relate to the damming of rivers and the problems of planning and financing large scale projects. Rivers are used by fish and they have scenic and cultural value. Furthermore areas flooded by dams are no longer available as wildlife habitat, agricultural land or forest area.

### Thermal

Thermal power requires very little area with little disturbance to water courses. This gives it siting flexibility. It is also feasible at a much smaller scale than hydro, which makes it faster to plan and build and makes it more flexible in operation. The major disadvantage is the emissions produced by burning fuel to generate power. Carbon dioxide is inevitable in the burning process, while sulphur dioxide, oxides of nitrogen and particulate matter can be largely controlled by technology. The need for fuel may also imply a mining operation for coal and this may also be considered undesirable.

### Alternative

Alternative energy sources have already been discussed in the section on how we can meet our energy needs. This includes demand side management, improvements to existing facilities and independent power production. The latter includes cogeneration, small scale hydro, and various other technologies. The major advantage of this group of energy sources is diversification in the face of future uncertainty. Much of the technology for small scale production is new and developing rapidly. That which is now economically unfeasible may become a viable option during the next few decades. On the other hand, alternative technologies do impact resources in the development of their components.

### Transmission

Transmission corridors are a necessary component of any energy development. In general, large scale hydro developments at remote locations require more new high-voltage transmission lines than smaller generation facilities sited closer to existing needs. In order to tie in small scale alternatives, a larger network of smaller transmission lines is required.

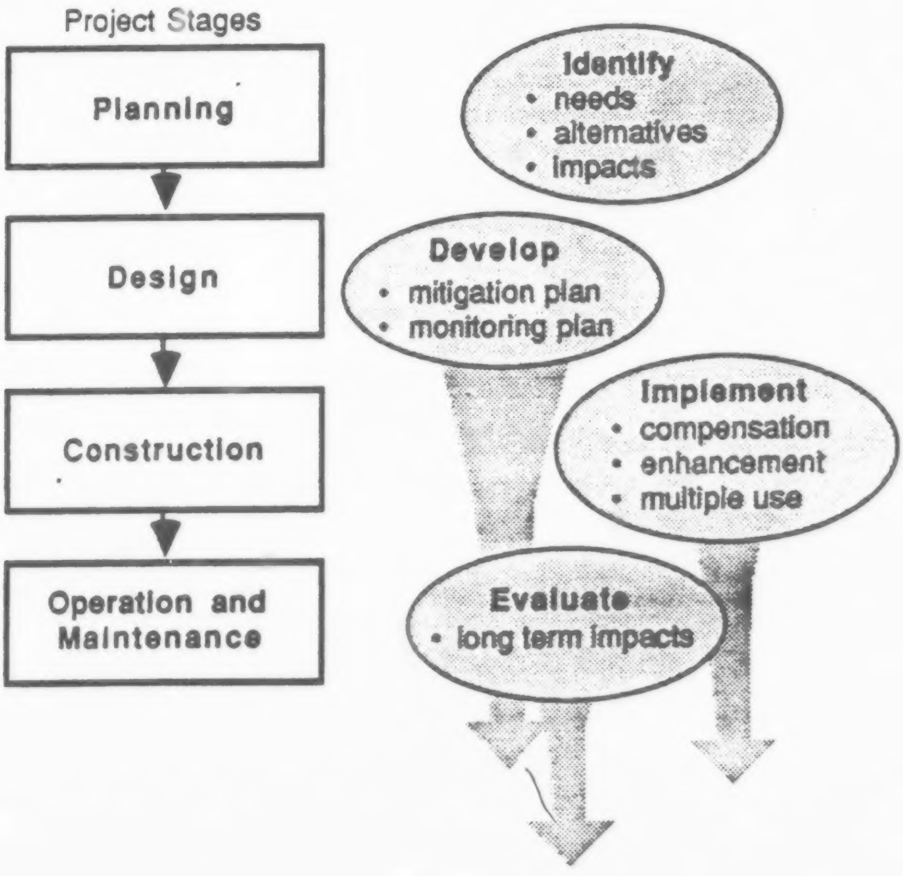
Transmission lines affect forestry, agriculture, wildlife, and aesthetics. There is also concern about the possible effects of electric and magnetic fields. No one likes a transmission line in their area, but everyone benefits from the delivery of electrical energy. Location of corridors, routes within the corridors and specific alignment of lines along the routes depend heavily on public consultation.

## Project Impacts

B.C. Hydro's environmental guidelines specify that impacts have to be considered at each stage in the development of a project. Basically there are three types of impacts:

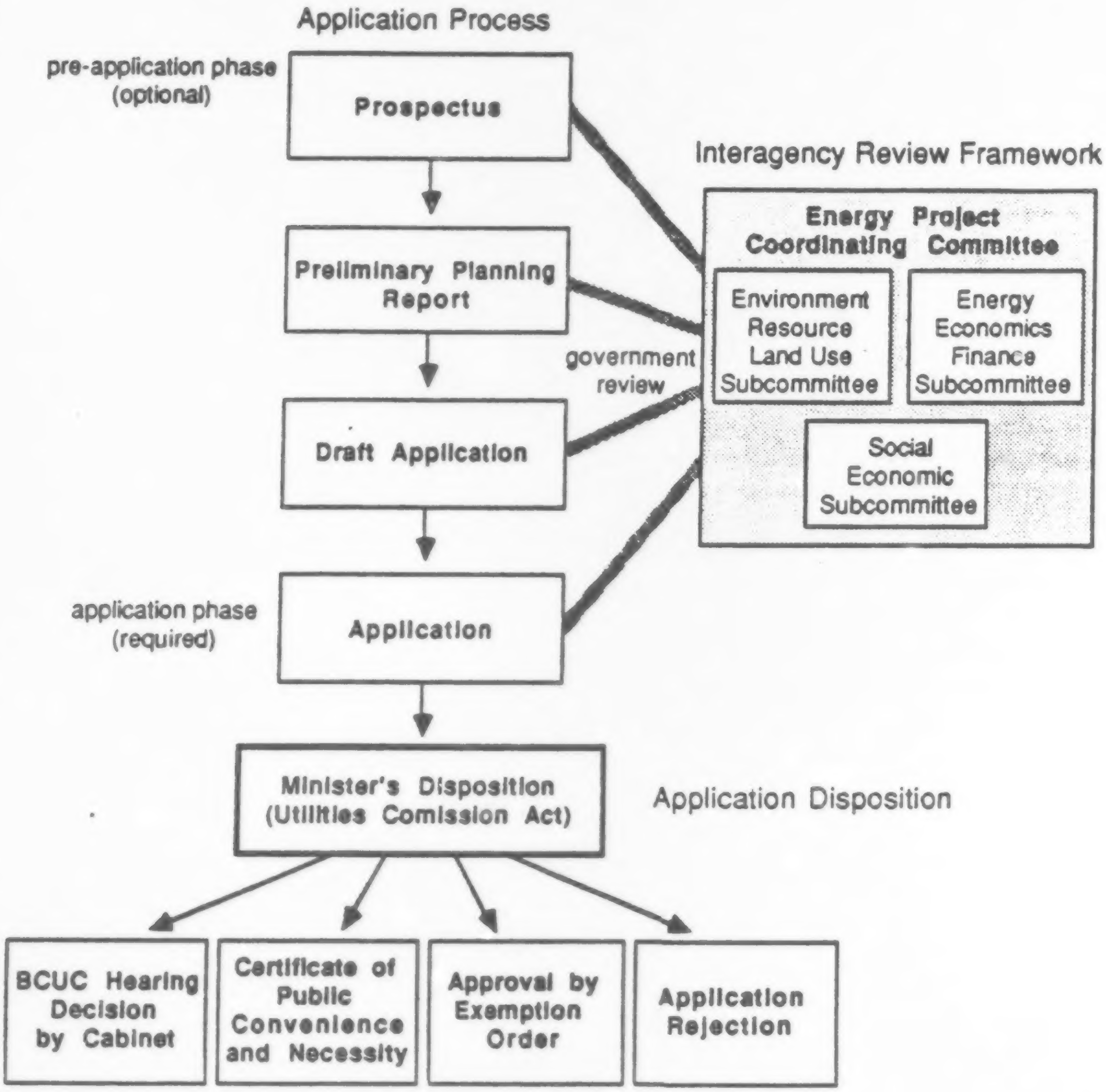
- **Ecological**
  impacts on soils, vegetation, fish and wildlife and their interaction with each other and their environment
- **Social**
  impacts on the well being of people, including health, income, lifestyle and values
- **Economic**
  impacts on the society as a whole - measured by economic variables such as gross provincial productivity, inflation, jobs, etc.

The figure below shows stages in the development of a project from planning and design to construction and operation. The ways in which the environmental guidelines address environmental (that is ecological and social) impacts at each stage is indicated in the ovals.


Project Stages
Planning
Design
Construction
Operation and Maintenance
Identify
• needs
• alternatives
• impacts
Develop
• mitigation plan
• monitoring plan
Implement
• compensation
• enhancement
• multiple use
Evaluate
• long term impacts

## Energy Project Review Process

In addition to the project planning and development process undertaken by B.C. Hydro, all major energy projects must obtain certification under the Utilities Commission Act. The Act establishes the provincial Energy Project Review Process which ensures all projects meet provincial standards. Details of this process will be provided at the forum in a handout prepared by the Ministry of Energy, Mines and Petroleum Resources. A summary of the provincial Energy Project Review Process is presented in the figure below.


Application Process
pre-application phase (optional)
Prospectus
Preliminary Planning Report
Draft Application
application phase (required)
Application
government review
Interagency Review Framework
Energy Project Coordinating Committee
Environment Resource Land Use Subcommittee
Energy Economics Finance Subcommittee
Social Economic Subcommittee
Minister's Disposition (Utilities Comission Act)
Application Disposition
BCUC Hearing Decision by Cabinet
Certificate of Public Convenience and Necessity
Approval by Exemption Order
Application Rejection

Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

# ENERGY PROJECT REVIEW PROCESS

## WHAT IS THE ENERGY PROJECT REVIEW PROCESS?

- The Province's review procedure for energy projects.
- Legislated by the Utilities Commission Act.
- Applied to major energy projects ("regulated projects") which generate, use, store, transport, or transmit large quantities of energy.
- Regulated projects are defined according to the amount of energy generated, used or transmitted:
  - electricity generation projects of 20 MW or more;
  - transmission lines of 500 kV or more;
  - pipelines capable of transporting 16 petajoules of energy per year;
  - facilities capable of storing or shipping 3 petajoules of energy;
  - facilities capable of using 3 petajoules per year;
  - projects designated by cabinet.
- Major topics addressed:
  - description of project;
  - identification of environmental and socio-economic impacts;
  - project justification;
  - public consultations.

## GOAL OF REVIEW PROCESS

- To facilitate and expedite economically sound and environmentally and socially acceptable energy development ventures in British Columbia.

## HOW?

- Early identification and management of environmental, economic and community impacts.
- Guidance to proponent in obtaining permits and licenses needed to operate.
- Coordination and realistic staging of government regulatory approvals.
- Determination of financial and economic viability where public sector investment or significant impact management programs are involved.
- Phased review with flexibility to deal with projects of different scope and complexity.

- Coordination by interagency steering committees providing one major contact point between proponents and government.

- Proponent initiates public consultation process. British Columbia Utilities Commission may be asked to hold Public Hearings.

## TECHNICAL FOCUS

- Project Justification:
  - supply/demand forecasts;
  - benefit-cost analysis;
  - financial feasibility.

- Site and Route Selection:
  - define study region;
  - identify and assess location alternatives;
  - assess preferred location(s);
  - identify mitigation and compensation proposals.

- Biophysical and Land Use Information:
  - assess and manage impacts on air quality, vegetation, agriculture, forest resources, recreation and aesthetic values, water resources, wildlife resources, land tenure, status and use.

- Socio-Economic Information:
  - manpower requirements, impacts on local labour markets;
  - impact on education, recreation, health care, social services and fire and police protection;
  - financial implications for local governments.

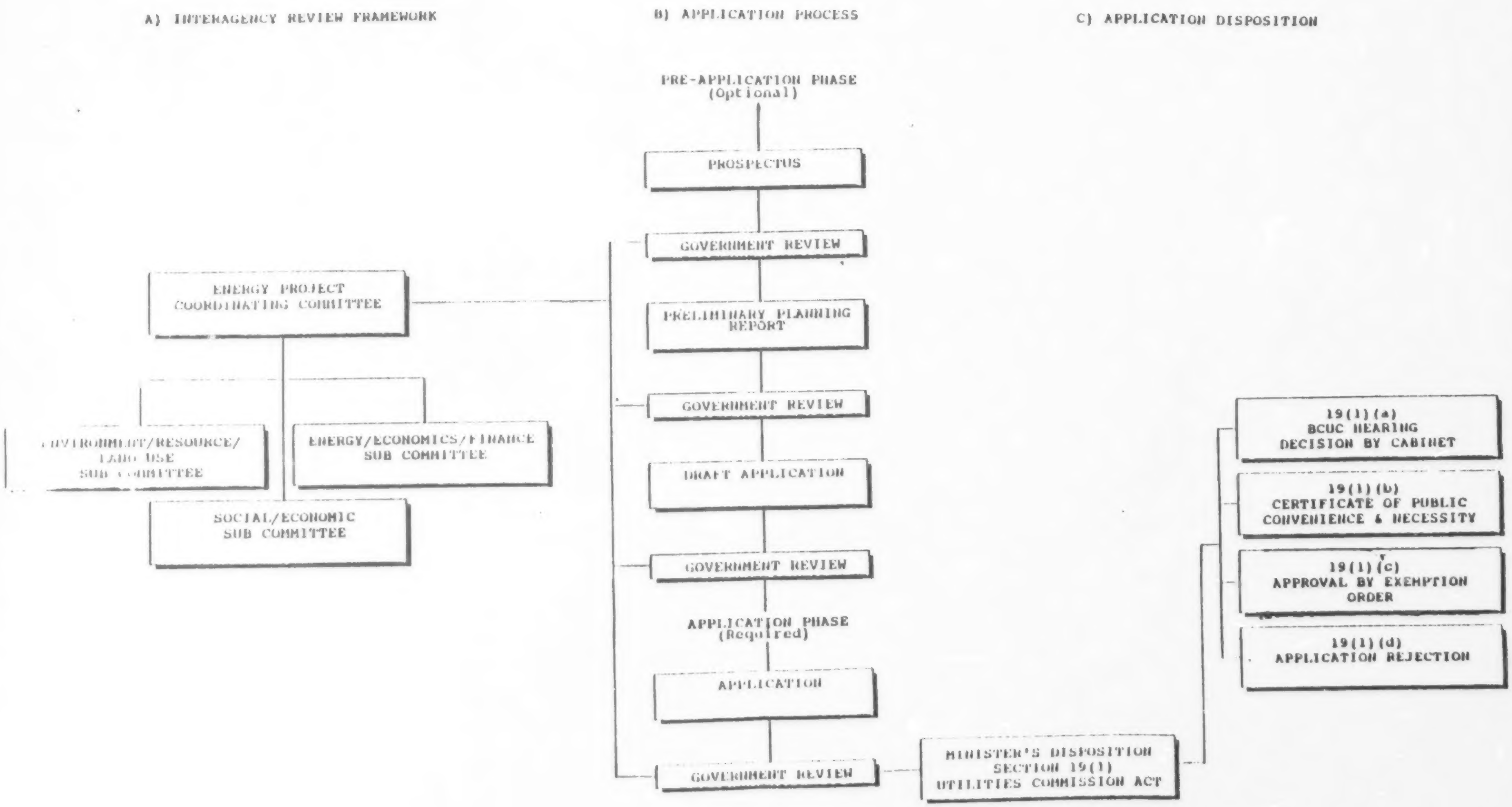
## APPROVAL

- Energy Project Certificate:
  - approval for construction granted by Cabinet;
  - contains terms and conditions.

- Energy Operation Certificate:
  - approval for operation granted when conditions are implemented.

- Ministers' Order:
  - for approval of projects that have not been subject to hearings;
  - contains terms and conditions;
  - signed by both the Minister of Environment and the Minister of Energy, Mines and Petroleum Resources.

# ENERGY PROJECT REVIEW PROCESS


A) INTERAGENCY REVIEW FRAMEWORK
B) APPLICATION PROCESS
C) APPLICATION DISPOSITION
ENERGY PROJECT COORDINATING COMMITTEE
ENVIRONMENT/RESOURCE/ LAND USE SUB COMMITTEE
ENERGY/ECONOMICS/FINANCE SUB COMMITTEE
SOCIAL/ECONOMIC SUB COMMITTEE
PRE-APPLICATION PHASE (Optional)
PROSPECTUS
GOVERNMENT REVIEW
PRELIMINARY PLANNING REPORT
GOVERNMENT REVIEW
DRAFT APPLICATION
GOVERNMENT REVIEW
APPLICATION PHASE (Required)
APPLICATION
GOVERNMENT REVIEW
MINISTER'S DISPOSITION SECTION 19(1) UTILITIES COMMISSION ACT
19(1)(a) BCUC HEARING DECISION BY CABINET
19(1)(b) CERTIFICATE OF PUBLIC CONVENIENCE & NECESSITY
19(1)(c) APPROVAL BY EXEMPTION ORDER
19(1)(d) APPLICATION REJECTION

## A. INTERAGENCY REVIEW FRAMEWORK

### 1. Energy Project Coordinating Committee (EPCC)

Main Agencies:

- Energy, Mines and Petroleum Resources
- Environment
- B.C. Utilities Committee (BCUC)

Main Responsibilities:

- overall project review coordination

### 2. Environment/Resource/Land Use Sub Committee

Main Agencies:

- Environment
- Parks
- Agriculture and Fisheries
- Crown Lands
- Forests
- Municipal Affairs, Recreation and Culture
- Transportation and Highways

Main Responsibilities:

- Environmental impact assessment
- Benefit/cost analysis
- Mitigation/compensation
- Permitting

### 3. Socio/Economic Sub Committee

Main Agencies:

- Municipal Affairs, Recreation and Culture
- Attorney General
- Regional Development
- Education
- Health
- Social Services and Housing
- Intergovernmental Affairs
- Advanced Education and Job Training
- Ministry of State - Regional Development Officer in the appropriate area of proposed project

Main Responsibilities:

- Impact analysis
- Social services
- Mitigation/compensation
- Permitting

## 4. Energy/Economics/Finance Sub Committee

Main Agencies:

- Energy, Mines and Petroleum Resources
- Regional Development
- International Business and Immigration
- Finance

Main Responsibilities:

- Energy policy
- Demand/supply forecasting
- Economic/financial feasibility
- Benefit/cost analysis

## B. APPLICATION PROCEDURE

### 1. Prospectus (Optional)

. Description
. Rationale

### 2. Preliminary Planning Report (Optional)

. Location options and preference
. Benefits
. Proposed studies

### 3. Draft Application (Optional)

. Applicant description
. Project description
. Impact assessment and mitigation
. Justification
. Permits, licenses
. Public consultation
. Other information as required

### 4. Application

. requirements specified by B.C. Regulation 388/80

## C. MINISTERS DISPOSITION

. Section 19(1) Utilities Commission Act (UCA)

**19(1)(a)**

- Energy Project Certificate Application (EPCA) referred to the BCUC for review
- terms of reference for the hearing developed
- BCUC hearing
- BCUC recommends to Cabinet
- Cabinet decision to issue of refuse the EPC

**19(1)(b)**

- Certificate of Public Convenience and Necessity (CPCN)
- Referred to the BCUC under Part 3 of the UCA
- BCUC decision to issue or refuse a CPCN
- construction and operation

**19(1)(c)**

- Exemption Order by Ministers of Energy and Environment
- construction and operation subject to conditions

**19(1)(d)**

- rejection

B.C. Hydro
970 Burrard St. Vancouver B.C. V6Z 1Y3
Telex 04-54512

# REQUEST FOR PROPOSALS

## SCHEDULE

| | ISSUE DATE | CLOSING DATE |
|---|---|---|
| FORT NELSON | ISSUED | 27 FEB 1989 |
| DOMESTIC > 5 MW(1988) | ISSUED | 30 APRIL 1989 |
| EXPORT EXPRESSIONS OF INTEREST | ISSUED | 15 MARCH 1989 |
| EXPORT RFP | FALL, 1989* | ? |
| BELLA COOLA | MAR 7, 1989 | 31 August, 1989 |
| REMAINDER OF NON-INTEGRATED | DURING 1989/90 | ? |
| DOMESTIC < 5 MW | MARCH-JUNE, 1989 | ? |
| DOMESTIC > 5MW(1989) | FALL 1989 | ? |

*-DEPENDENT ON SUCCESS OF EOI & POWEREX'S MARKETING EFFORTS.

2 February, 1989

# Electrical Energy Forum
# Questions for Discussion

## Project Planning

Friday, May 12

On Friday AM there will be four simultaneous workshop sessions on: Water (hydroelectric), Thermal, and Alternative Resources, and Electrical Transmission. For each subject area the three hour period will be divided into three distinct discussion topics:

1. What are the issues in planning projects of this type?
   What are the priorities in terms of:
   long term benefit to British Columbia,
   need for immediate action,
   and in terms of personal impacts or personal values?

2. What are the barriers to resolving each of the key issues identified above?

3. What actions would overcome the barriers?
   What are the specific tasks?
   Who requests them?
   Who can do them?
   What result would indicate success?

# Electrical Energy Forum
# Questions for Discussion

## Long Range Planning

Thurdsay, May 11

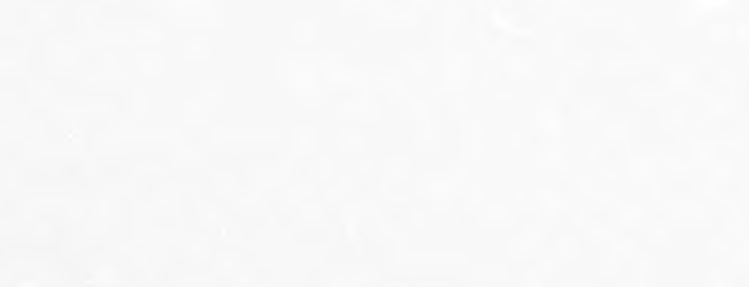
The Thursday PM session will focus on B.C. Hydro's long range planning and the two hour workshop period will be divided into two distinct topics:

1. What are your concerns with demand forecast or supply scenarios?
2. Who should be involved in long range planning?
   What would they contribute?
   What mechanisms are recommended for involving them?

# ELECTRIC ENERGY

FORUM

## Energy and the Environment



## LIST OF ATTENDEES

# ATTENDEES AT 1989 ENERGY FORUM

| NAME | TITLE | AFFILIATION |
|---|---|---|
| G.D. Akins | Dir,Water Res & Ener | Crippen Consultants |
| Garry Alexander | Water Use Specialist | Min. of Environment |
| Mary Algar | Comm. Rel. Co-ord. | B.C. Hydro, 21st Fl. |
| John Allan | Ast. Deputy Minister | Ministry of E.M.&P.R. |
| Charles Alton | Environmental Coord. | Bonneville Power Adm. |
| Paul Archibald | Project Engineer | G.V.R.D. |
| Raymond R. Argamany | Sr. Sales Rep. | Mobil Oil Canada |
| Tracey Armitage | | |
| Gary Ash | Principal | RL&L Environmntl Svcs |
| John D. Austin | Consultant | J.D. Austin, P.Eng. |
| Don Bacon | Vice-President | TransAlta Utilities |
| John Baird | Industrial Advy.Engr | B.C. Hydro |
| Yves Bajard | | First Watercount Syst |
| Jim Baker | Press | Conservation Act Rpt. |
| G. Balachandran | Evaluation Engineer | Min. of Environment |
| Jeff Barker | Project Manager | B.C. Hydro, Room 231 |
| Diane Barker | Envir. Studies Engr. | Ontario Hydro |
| Jim Barnes | President | Central Heat Distr. |
| Darlene Barnett | Gen. Counsel & Mgr. | B.C. Hydro, 18th Fl. |
| John A. Barrat | Engineering Manager | |
| Dr. Olga Barrat | | Barrat & Assoc. |
| Jerry Bartram | Director - Programs | Energy, Mines & Res. |
| Ellen Battle | Consultant | Ministry of E.M.&P.R. |
| Juergen Baumann | Consultant | Entech Env Consultnts |
| Warren Bell | Acting Director | Ministry of E.M.&P.R. |
| Larry Bell | Chairman & C.E.O. | B.C. Hydro |
| Richard Belluz | Sr Proposals Engr | Atomic Energy, Canada |
| Tom Bennett | Sr. Policy Analyst | Ministry of E.M.&P.R. |
| Jane H. Bergler | Project Manager | P.G. & E., R & D |
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| Rob Best | | |
| David Bevin | Engineering Manager | |
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| Orville W. Campbell | Hydropower Manager | James River Corp. II |
| W.A. Campbell | President | Elect.Consumers Assn. |
| Frank Cappello | Mgr., Customer Serv. | B.C. Hydro |
| Dorell Carlson | Energy Consultant | D. Carlson |
| David Chan | | B.C. Hydro |
| Dr. Donald Chant | Chairman & President | Ontario Waste Mgmt. |
| J.D. Chapman | Prof, Dept of Geog | University of B.C. |
| Bill Chatterton | Publications Editor | B.C. Hydro, 21st Fl. |
| Ronald L. Cliff | Rates Engineer | B.C. Gas Inc. |
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| Penny Cochrane | Computer Sppt. Spec. | B.C. Hydro, 20th Fl. |
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| Desmond Connor | President | Connor Development |
| Denis Connor | President | Science Council of BC |
| G.A. Sandy Constable | VP,Marktg. & Finance | Cryogas Engineering |
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| Patricia Cracknell | Research Director | VI PubInterest Res Gp |
| Ernie Cray | Prov. Vice-President | United Native Nations |
| Bob Crockett | Marketing Manager | B.C. Hydro |
| Dennis Cross | Cust Svc,Design Supr | B.C. Hydro |
| Rick Crozier | Head, Environmental | Waste Mgmt., Kootenay |
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| Laverne Dalgleish | Secretary Treasurer | Nat.Energy Consv.Assn |
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| Mark S. Danley | Pub Involv Specialst | Bonneville Power Adm. |
| Ruth Ann D. Darnall | Chairperson | Peace Valley Environ. |
| Hon. Jack Davis | Minister | Ministry of E.M.&P.R. |
| Cliff Day | Industrial Mrkt. Eng | B.C. Hydro |
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| Angie Deaust | | |
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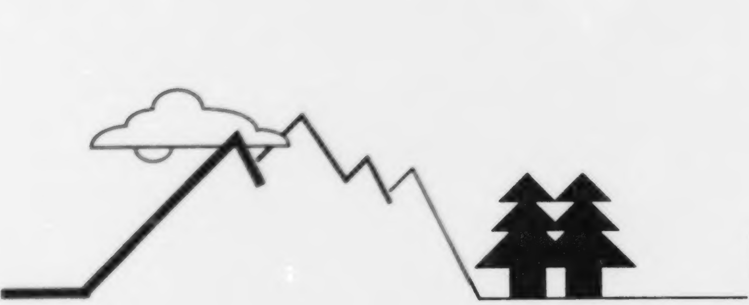
| Silvaine Zimmerman | | Greenpeace Foundation |

# ELECTRIC ENERGY

## FORUM

## Energy and the Environment



## NEWSPAPER CLIPPINGS

Energy Forum EXTRA

Supplement to B.C. Hydro News June/July 1989

# Participation the key ingredient at 1989 Forum

**Debate was lively at the Energy Forum workshops. A sampling of the ideas that came out of these discussions is on page 5A.**

## *Second annual gathering tackles environmental issues*

Feedback from participants was the key ingredient of this year's Electric Energy Forum on "Energy and the Environment" held in Vancouver May 10 to 12.

Over 400 people came to discuss one of the toughest questions facing utilities today. How do you go about meeting the demand for more electrical energy in an age when the long-term negative effects of development on our ecosystem are becoming increasingly evident?

This second annual forum, co-sponsored by Hydro and the provincial ministries of Environment and Energy, attracted representatives from industry, environmental groups, government and other utilities who came to hear an impressive list of speakers and to participate in the discussions.

Commitment to new energy resources will be needed in the near future and Hydro wants to create an awareness as to the kinds of energy resource decisions that must be made by British Columbians in the future. To provide for input from all participants, five hours were set aside at the forum for discussions in a "workshop" setting.

In a summary of the 20-Year Resource Plan released at the forum, we tell the public the province now faces important decisions regarding future power requirements. Public consultation will play a critical part in determining what the future energy mix will be, the summary says.

The energy forum provided the first opportunity for public comment on the plan. Participants said they want more opportunities to debate future resource scenarios and they want more information. Now, more than ever before, planning has to be done with recognition of the value the public places on the environment.

This supplement to *B.C. Hydro News* looks at the major ideas and views expressed at the forum by speakers and other participants.

### *LARRY BELL SAYS:*

## Environmental code of ethics depends on staff

Chairman Larry Bell announced Hydro has plans to increase environmental awareness among employees.

"In our view, an environmental code of ethics cannot be imposed by senior management, it requires the enlistment of employees," he said.

"It is our goal to empower all employees to think and consider the environment in their daily work and to offer their suggestions on how we might improve."

Environmental guidelines are being drafted to raise the profile of environmental concerns within the organization. Most of the strategies under consideration are things we are already doing, like mitigation and enhancement. But what is different is the emphasis being placed on sustainable development.

*Sustainable development means meeting the needs of the present without jeopardizing the ability of future generations to meet their own needs.*

This concept can be seen in the resolution adopted by Hydro's board of directors:

"In carrying out its business, B.C. Hydro will minimize adverse effects on the natural and social environment and actively pursue opportunities to manage these resources for the benefit of future generations."

*continued on page 2*A

### *The Cutting Edge*

Energy efficiency policies must be the cutting edge of national energy strategies for sustainable development.

*— Excerpt from "Our Common Future", the Brundtland Commission report.*

# Maurice Strong brings global perspective

As keynote speaker at the forum, Maurice Strong was given the task of putting our regional concerns into perspective by describing the condition of the environment on a global scale.

As one of two Canadians on the influential United Nations' World Commission on Environment and Development, he was well equipped to do that. The commission, which was led by Prime Minister Gro Brundtland of Norway, published its report, "Our Common Future", in 1987. This report is recognized as giving the concept of sustainable development the momentum it has today.

Maurice Strong believes that while the energy crisis has gone away, the need for environmentally-sound energy alternatives is even more acute. He puts it this way:

"The processes by which our planet's life systems are being undermined and human life being put at risk are more like cancer. They're growing slowly. They're pervasive. The signs are not immediate, but by the time they become acute, it will be too late."

He says while human population has tripled so far this century, if you look at energy use, human impacts on the globe's environment and resources have increased by 30 times.

The Brundtland Commission's conclusion was sobering, says Mr. Strong. "The survival of the human species, life as we know it, is indeed at risk. If we continue our present course, we cannot take our survival for granted."

Fortunately, the concern for changes in climate which have recently manifest themselves may turn us around, Mr. Strong says.

The Brundtland Commission recommends the world should develop low energy paths based on renewable sources. It says no environmentally-sound, economically-viable, energy pathway to our future is currently available.

**Keynote speaker Maurice Strong (left) chats with B.C. Energy Minister Jack Davis.**

A transitional stage is necessary to make the larger transition to sustainable development, Mr. Strong explains. "We must constrain our use of fossil fuels and we have to change our mix of fossil fuels." Oil is less damaging to the atmosphere than coal, and gas is better than both of them.

While developed countries should work toward more conservation and less use of coal over the next 20 to 30 years, underdeveloped countries have a different challenge, Mr. Strong says. First they must make the transition from wood fuel to liquid fuels.

# Guidelines focus on impact of daily activities

*from page 1* A

The environmental guidelines have been reviewed by employee focus groups. They will be distributed to employees in final form in July. Environmental Resources director Lorne March reports these sessions have resulted in many improvements to the wording. As well, a video is being prepared for employees to raise understanding of environmental issues in our operations and to describe our environmental guidelines.

Another significant announcement made by the chairman was the appointment of Chris Boatman as vice-president of Corporate and Environmental Affairs. By adding environmental concerns to Mr. Boatman's responsibilities, greater emphasis is being placed on the environment at a senior level.

Mr. Boatman outlined Hydro's strategy for ensuring the corporation is environmentally responsible.

"Those companies who consider the issue to be 'motherhood' and intend to pay lip-service to it, risk their future on a tide of regulatory and public backlash," he said. "In the past, environmental policy formulation has been invariably a top-down exercise with minimal employee input into policies or budgets.

**Larry Bell**

**Chris Boatman**

"In my opinion, a corporation that is seriously committed to environmental protection and wishes to earn the reputation for having this commitment, needs to adopt the following strategic approach: involve employees in the development and implementation of corporate environmental responsibility.

"It is not the 'global' environmental statements and principles but rather the day-to-day attitudes and behaviour of employees, from the janitor to the chief executive officer, that will make or break a corporation's image with regard to the environment.

"We want all employees to consider the environmental impacts of their day-to-day activities," he said.

**EPP PRAISES B.C. PROGRAMS**

# *Market-based energy policy still pursued*

In his speech at the forum, federal Minister of Energy Jake Epp detailed upcoming changes to electricity policy regarding the environment and exports.

Mr. Epp told the audience the government plans to continue to pursue a market-based energy policy.

"While much has been accomplished in deregulating oil and gas," the minister says, "high on my agenda is deregulation of electricity exports."

Mr. Epp said it should be unnecessary for both the provinces and the national energy board to regulate exports and international transmission lines. Under the new electricity policy, exports and international power lines will continue to require authorization by the federal government, but won't require a public hearing by the national energy board under normal circumstances. As well, the policy extends the maximum term of export licences from 25 years to 30 years.

Hon. Jake Epp

"This should make it easier to finance large new electricity generation and transmission projects," the minister said. "At the same time, it will prevent exports from being permanently alienated from Canada.

"Deregulation doesn't mean that the federal government has abandoned its commitment to a healthy environment," Mr. Epp said.

"A key element of the federal government's electricity policy will be the development of guidelines to reduce the adverse impacts associated with electricity generation projects. These will be developed in conjunction with the provinces to ensure a national consensus on environmental norms while providing flexibility for local circumstances."

The minister also mentioned that in 1986 the federal government created a task force on environment and economy in response to the Brundtland Commission. As a first step toward environmentally benign development, the task force recommended establishing national and provincial roundtables comprised of all stakeholders, including the public. Almost all the provinces, including B.C., have done so.

"I am particularly heartened by the work being done in British Columbia," said Mr. Epp. He referred to our cultivation of independent power producers, our Power Smart program and our efforts to assess the benefits of co-ordination with TransAlta. He has asked the National Energy Board to identify measures that would enhance interprovincial electrical trade and he hopes other utilities emulate Hydro's and TransAlta's progress in this area.

***PROVINCIAL INITIATIVES DESCRIBED***

# Strategies must anticipate and prevent rather than react and repair

"In my view sustainability depends on development strategies that anticipate and prevent, not react and repair," provincial Minister of Environment Bruce Strachan told participants.

Mr. Strachan reviewed several of the initiatives his ministry has taken over the last year.

"In January we appointed a special task force on environment and economy chaired by University of British Columbia president David Strangway. The task force has the job of strengthening links between environment and economic objectives.

"We have a new province-wide standard which limits the sulphur content of industrial fuels to 1.1 per cent. This is the toughest regulation of its kind in Canada."

The ministry is also moving to reduce pollution at its source by intensifying monitoring and creating timetables for improvements.

Hon. Bruce Strachan

"Last winter all mills using chlorine bleaching process were required to submit dioxin reduction plans to my ministry. In co-operation with the federal government, we will ensure these plans go into effect next year," Mr. Strachan said.

Just prior to speaking at the forum, the minister announced new dioxin standards for the pulping industry. As well, the ministry is in the middle of developing regulations on the use of chloro-fluoro carbons.

"We must redouble our efforts to reduce dependence on fossil fuels," said Mr. Strachan. "Energy conservation must be encouraged whenever possible and we must look closely at technologies.

"My message today is we all share responsibility for environmental sustainability. Industry — for reducing pollution discharges and developing cleaner technologies. Government — for tougher regulations and enforcement and effective monitoring and response procedures. And all of us for creating a market that increases the use of environmentally sensitive products and reduces inefficiency and waste."

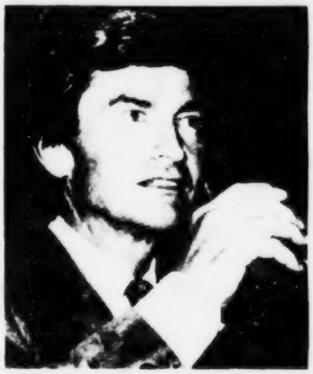
# Perceptions of plenty

Water management provides a sharp focus for sustainable development, says UBC professor of forestry and economics Peter Pearse. "It is a pervasive and crucial element in both economic production and the natural environment."

As chairman of the 1984 Inquiry into Federal Water Policy, Dr. Pearse is an expert in water resource management. He thinks water should be priced according to its value to further the goal of sustainable development.

"Water is so abundant in Canada that we tend to take it for granted. Perceptions of plenty lead us to disregard the value of this natural resource and the need for careful management," he says.

Canada contains about one-quarter of the world's stock of fresh water, says Dr. Pearse. "But this figure is deceptive. Most of the country's great rivers flow north away from the southern concentrations of our population and industry."



**Dr. Peter Pearse**

The price of water, like the price of electricity, doesn't reflect its true value.

Dr. Pearse notes, "In cities where water is supplied to households free or at fixed rates regardless of use, the average household use is often double that in cities where water is metered and priced. Excessive use creates a need not only for more water, but also for additional capacity in municipal water systems and waste collection and treatment works. People who get their water 'free' ironically end up paying more for it one way or another."

He points out the environmental resources that are suffering from our economic activity are those that we deny the protection of market rationing: our wildlife, our sport fishing, our water and air and even the ozone.

# *Four suggestions for Hydro*

Canadian World Wildlife Fund president Monte Hummel says he's troubled by the way sustainable development is being defined.

"At best sustainable development says we must take a conservation approach to those natural resources which we choose to develop. It means managing our own behavior in relation to the environment as if we are here to stay, because this is the only earth we've got."

But Mr. Hummel says, "Emphasis on exploitation is precisely the reason why sustainable development has been so readily embraced by the resource sector. It fails to recognize the virtue of leaving anything alone."

The Brundtland report, Mr. Hummel points out, indicates we should reserve at least 12 per cent of the planet in a natural state. "Sustainable development doesn't mean managing every square centimetre."

Mr. Hummel recommends Hydro do four things if it wants to give sustainable development real meaning. First, support the establishment of protected areas. Second, emphasize demand-side management over supply-side. Third, match the form or grade of energy to the appropriate end use. Fourth, open up Hydro to input from the public.

"I hope you don't feel I'm suggesting this all comes as news to Hydro," he says. "I am suggesting that if you can make real progress on these four points, you will gain more and more support from the environmental community."

**Monte Hummel**

# *Excerpts from Forum letters*

"It is fairly easy to say that the Energy Forum was a big conference to tell industry what to expect from Hydro in the next decade or two. Certainly a very large percentage of those attending had financial commitments to energy and if this was an effort in public participation then the public represented had a very narrow range of viewpoints. But what came out of the conference was not like that at all. The introduction of speakers like Maurice Strong, Monte Hummel, Peter Pearse and Donald Chant, together with the introduction of B.C. Hydro new environmental policy statement, made 'the environment' the key word in the theme 'Energy and the Environment'.

All this seems to show that Hydro is on the right track by developing existing facilities to the utmost and concurrently going to Power Smart and other methods of saving electric energy. The big problem for all of us is how to handle the long-term beyond the year 2000."

**Norman Purssell**
**The Federation of**
**British Columbia Naturalists**
**West Vancouver, B.C.**

"Congratulations to you and all the B.C. Hydro employees involved on a very well run and informative symposium. I was especially heartened by the overall positive tone of the conference, and by the increased emphasis being placed by the utility on environmental awareness and public participation in the planning process.

The frequency of land-use conflicts and resource trade-offs will only increase with time, both in B.C. and elsewhere. The management that you, Mr. Boatman, Mr. Peterson and Mr. Crockett appear to offer will go a long way in speeding the resolution of resource management issues. I hope that we continue to see such demonstrations of willingness to change and adapt, not just from B.C. Hydro, but from industry and government as well. B.C. Hydro could, however, always act as the role model."

**Timo Makinen**
**Burnaby, B.C.**

# Workshops trigger a wide range of ideas and concerns

Participants had plenty to tell Hydro during workshop discussions. Table arrangements where six to eight people were seated together afforded lively debate in which all could take part. With help from facilitators, each table tackled a series of questions on what our future energy mix should look like.

The ideas that sprang from these discussions were many. Here is a sampling of participants' concerns.

- Increase public involvement. Hydro needs to build credibility and public support for projects in the future.
- Take a proactive role on environmental matters by disseminating information in a low key manner and engaging independent scientific experts.
- Hydro needs to develop a consistent approach to impact assessment and monitoring..
- There is a need to define what is acceptable development and what is not.
- Measures should be taken to address public confusion over provincial regulatory and licensing process.
- There is a lack of strategy for placing local concerns in context of larger planning concerns. Hydro needs to increase regional forums for discussion.
- There is a wide lack of knowledge among the public concerning thermal generation which should be addressed.
- Methods of factoring in social and environmental costs have to be designed.
- Even more emphasis should be placed on Power Smart.
- Hydro needs to differentiate between which projects are for domestic requirements and which are for export. Confusion exists about exports. The perception is that if you can export, you must have energy left over.
- Hydro needs to demonstrate that alternative energy sources are being properly considered; alternative resources need fair opportunity to demonstrate they are practical by investing in research and development.
- Current costing practice is a barrier to conservation.
- Energy efficiency should be legislated.

**A Canadian uses 100 times the resources of someone in a third world country, says Dr. Donald Chant.**

## *Donald Chant says a common understanding is required*

Donald Chant, chairman and president of the Ontario Waste Management Corporation, says these questions bother him:

"What does sustainable development really mean? Do we have any common understanding? Where will the leadership come from?

"Some people take it to mean continuing development, but some limits have to be put on growth in order to achieve a steady state," he says. "Only when we all come to a common understanding will we know how deep the division between us will be."

Dr. Chant applauds Hydro's emphasis on guidelines, but says, "When all is said and done, they set conditions for doing things. They do not set boundaries for go/no go decisions.

"I think big changes are ahead for your business. We simply cannot keep producing electricity in ways that produce vast amounts of acid rain nor can we dam every large river in the world or build a nuclear power plant in every city.

"Historically and still today, we tend to measure the successes of our utilities in terms of their expansion and in terms of increased revenue and increased profits or surplus. Realization of the absolute necessity of implementing the concept of sustainable development forces us to develop a whole new approach to generation, economics and the marketing of energy."

Dr. Chant believes we are too quick to assume the problem lies with third world countries. He points out each Canadian uses 100 times the resources of someone in one of these nations. "We 28 million Canadians have the impact of 2.8 billion in the third world."

On acidification, Dr. Chant says, "It is a growing issue in British Columbia, I think. Half the lakes in eastern Canada are at risk."

On the greenhouse effect he says, "Acid rain is bad enough but the greenhouse gases such as $CO_2$ have even more serious implications. The burning of carbon fuels pumps about six million tonnes of $CO_2$ into the world's skies every year and you can add another one or two billion from the burning of tropical rain forests."

# Hydro's speakers report progress on DSM and private power initiatives

At the first annual Electric Energy Forum held in June 1988, Hydro introduced its demand-side management initiatives and its plans for encouraging generation by outside producers.

At this year's forum, our speakers reported on the progress that has been made in these two areas.

**Hydro's marketing manager, Bob Crockett (left) and Forum chairman Don Swoboda, vice-president, Production.**

## Power Smart programs described by Bob Crockett

Marketing manager Bob Crockett described the demand-side management (Power Smart) programs.

Since Power Smart was launched in March, we have introduced a coloring contest to raise awareness among school children, a municipal audit program for communities, a Quality Plus program for builders of new homes and a Home Check-Up program for owners of existing homes.

Even before March, the energy efficient motor rebate program was in place and pilot programs had been carried out in communities throughout B.C.

All of this was good news to an audience convinced that conservation is essential to sustainable development. Bob Crockett assured forum participants Hydro won't stop here and that we are ensuring our own buildings are Power Smart and our generating facilities are Resource Smart.

## Morgan reports on proposals from private producers

Power contracts manager Wayne Morgan reported on the status of proposal calls from independent power producers. It was only 11 months ago that Larry Bell announced important new initiatives to include non-utility supply options in our resource plan to meet future loads. These options include independent power production, co-generation, load displacement and energy efficiency improvements.

Since the first forum, Hydro has signed contracts for independent power production with Queen Charlotte Power Corporation at Sandspit, Evans Products at Golden and Robson Valley Power Corporation at McBride. As well, Hydro is in the final stages of negotiation with three other groups.

Four different proposal calls have been issued so far. They are:

- Powerex called for expressions of interest for the supply of 400 to 600 MW of electricity to the export market. Twenty submissions were received involving a variety of fuel types: hydro, natural gas, coal, wood waste and geothermal.

- Requests for proposals went out for supply to the domestic market on the integrated system, specifically for projects over 5 MW for a total requirement of about 150 to 200 MW. Twenty-four firms submitted proposals. Again there was a variety of fuel types.

- Requests for proposals were issued involving projects under 5 MW for a total requirement of 25 MW. Again, this call is for the domestic market on the integrated system. At the moment, the offering is still open. It will close August 15 unless the 25 MW is subscribed to before that time.

- Non-Integrated areas. For Fort Nelson, a call for proposals has been issued and one proposal received from Westcoast Energy and Canadian Utilities. Discussions on this proposal are underway. For Bella Coola, an offering has also closed with eight proposals submitted. Proposals will be requested for other non-integrated areas prior to the end of this year.

**Wayne Morgan**

## We're looking at both sides of the energy equation

Also bringing participants up to date on our activities was Ken Peterson, manager of policy and planning. A significant change has taken place in our approach to development of new resources, he explained. Now we are looking at the demand side as well as the supply side of the equation. As well, Hydro is looking at an appropriate mix

**Ken Peterson**

of public and private sector development.

In light of Hydro's objectives, we need to array our options, said Mr. Peterson. Through a series of graphs, he showed how our options for the next 10 years are fairly well set, but beyond that time we could choose a resource mix based mainly on hydroelectric, on thermal, on demand-side management and alternative sources or a combination of these.

Before the public can give Hydro meaningful input on what options they most want to see, they have to understand some of the constraints of planning. Inherent difficulties are uncertainty in forecasting future demand and long lead times and financial risks associated with large new generation projects.

Expansion of the high-voltage transmission system is yet another important element to consider in planning, he indicated.

**BPA Administrator Jim Jura.**

# Jura sees co-ordination with Hydro important for sustainable development

Bonneville Power Administration administrator Jim Jura believes co-ordination with B.C. Hydro will play an important role in sustainable development.

"As important as our respective energy supplies are to us individually, I think it's even more significant that we've come together in this renewed spirit of co-operation," he said. "To achieve a more lasting energy relationship across borders is to do what's smart."

At the moment, Mr. Jura says we don't have in place the inter-regional exchanges to take advantage of seasonal differences.

"There's a number of things standing in the way as to why we haven't been able to bring those agreements together and they're usually political," he says.

Through improved co-ordination in the Columbia River basin, Mr. Jura says Hydro and BPA will increase capacity by 300 MW each.

He points to the Pacific Intertie as an example of how working together can reduce the need for new resources. He says this high-voltage intertie from Washington to southern California that was built in the 60s has been a major contributor to inter-regional energy efficiency and has reduced environmental impacts.

In reference to conservation, Mr. Jura says BPA has proved it works. Over the last nine years, Bonneville has implemented 32 specific demand-side management programs, invested $750 million and expects energy savings in the order of 3300 MW by 2020.

BPA's situation differs from Hydro in that conservation was legislated. In 1980 the United States Congress passed a bill which said BPA has to look to conservation first and had to give it an edge over other energy alternatives.

### *DAVIS ASSURES FORUM*

# Environmental costs are considered

B.C. Minister of Energy Jack Davis assured the forum audience Hydro will take full account of all the environmental costs associated with future development.

The minister explained that in B.C. electricity is priced well below its real market value, so it is used wastefully. This tends to create environmental problems.

Mr. Davis noted that Hydro, unlike most other electrical utilities in Canada, pays grants equivalent to the property taxes of other industries. The province also requires Hydro to pay water rental fees.

Mr. Davis also commented on future projects.

"We will have to decide within the next few years whether to go ahead with Site C (on the Peace River) or Murphy Creek on the lower Columbia and, clearly, we have to address all of the environmental concerns," he said.

He stated Hydro is also considering the possibility of building a project which would be tied to an export sale for a decade or two, or even three.

"Unlike other provinces, we have never financed a project based on export sales," he said. "The project would stand or fall dependant on the export contract, the export price and the longevity of the contract and it would be privately financed, not publicly."

**BChydronews**

**Material for this Energy Forum supplement was prepared by Kenna Hoskins.**

**Communications Centre,**
**970 Burrard Street,**
**18th floor, Vancouver,**
**B.C. V6Z 1Y3**

# Forum comments

## Change our attitudes

"I was pleased at the participation. There were people here with all sorts of views and that's the exciting part. It gives me great pleasure (to know) Hydro is looking to conservation...

"We've got to get down to the difficult choices. We can't dance around and look at the problem, then go away. We have to change our attitudes. All of us have to address the problem."

**Anne Edwards,** MLA for Kootenay riding and NDP critic for energy.

## Seeds are sown

"I believe corporations have a responsibility to a take a leading role. The average citizen, if anything, has been leading corporations' and governments' views on the environment and its time corporations took the lead...

"At the moment, I think Hydro is doing all that is possible in terms of sustainable development. Much has been done and much more will be done. I think we're seeing the seeds are sown and I'm really excited we'll see some of those carried through."

**Fred Liebich,** B.C. Hydro system studies engineer

## Consumer groups' role

"B.C. Hydro, under Larry Bell's leadership, has done some interesting things in the last couple of years — has made some improvements. But it has a long way to go — I don't think the battles are over yet...

"Consumer groups such as our own have a big role to play in making sure the right things get done for the good of the whole province and for the good of ratepayers as well as the atmosphere."

**Don Scarlett,** Okanagan-Kootenay Electric Consumers Association

## They were sincere

"B.C. Hydro is obviously making an attempt to get more community input into their operations, to involve the general public...

"I've been dealing with B.C. Hydro as an independent power producer for a year and a half and right from the outset they were sincere. They had problems, I had problems. But there was a real effort to work them out."

**Roger Blagborne,** Robson Valley Power

**Hydro's Fred Liebech was among the forum participants interviewed on camera by BCIT broadcast journalism student Wayne Cousins who is producing a video about the forum. The comments on this page are drawn from Wayne's interviews.**

## Wanted, not legislated

"A lot of what you've been hearing about conservation is what Bonneville has been involved in through legislation. This is going to be an interesting opportunity for B.C. Hydro because it's being accomplished because it is wanted rather than as a result of legislation...

"You can't mandate a lot of this. Perhaps a little too much of conservation in the United States depends on legislation...

"The major challenge facing B.C. Hydro is following up on this conference. You have done a great deal to raise expectations."

**Roy Fox,** Bonneville Power Administration

## Hydro has changed

"The most positive result — the people and press who were there are going to realize the character of Hydro has definitely changed. Five years ago you wouldn't have had a forum like this."

**Lorne March,** B.C. Hydro director of environmental resources

## More open and flexible

"It's very encouraging to see Hydro being more open and more flexible than perhaps they've been in the past...

We've been given some good answers here, although I'm not thoroughly convinced that Hydro's gone as far as they can in terms of public participation... We have to preserve the planet and B.C. Hydro is part of that."

**Gwen Johansson,** Peace Valley Environmental Association

## A more active process

"This is really the start of a more active process to solicit input in a meaningful way and to allow people to better understand the choices we're dealing with and the trade-offs that might have to be made...

"Our challenge now is to take the resource plan out and give it some visibility. The benefit will be greater public understanding."

**Don Swoboda,** B.C. Hydro, vice-president of production and chairman of the forum.

ELECTRICITY
TODAY
MARCH/APRIL
1989

## B.C. Hydro Hosts Energy Forum

VANCOUVER — "Energy and the Environment" is the theme of B. C. Hydro's second annual Electric Energy Forum, scheduled for May 10-12, 1989.

The forum will focus on British Columbia's energy demand and supply situation within the context of sustainable development and the use of environmental resources.

The Forum will highlight several subjects, including:

— Canadian government perspective;
— U.S. Northwest Energy & Environmental Issues
— B.C. Hydro's New Environmental Policy
— Hydroelectric Planning and Operations
— Thermal Planning and Operations
— Transmission Planning and Operations
— B.C. Hydro's Forecast and Resource Alternatives

For more information, contact:
Electric Energy Forum Hotline
(604) 663-3389.

CONRAD

Squamish (B.C.) Times

APR. 11. 1989

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# Giles to attend energy forum

Energy, the environment and sustainable development are the topics of a forum Ald. Brian Giles will be attending May 11 and 12.

The second annual Electric Energy Forum, held in Vancouver, will feature speakers such as BC Hydro chairman Larry Bell, Energy Minister Jack Davis, and Environment Minister Bruce Strachan.

At council's March 28 meeting Giles said he hopes to address topics which will have a direct impact on the community, including Canadian Crew Energy's Meagher Creek project and BC Hydro's plans for a possible new transmission line through the Valley.

Other topics Giles hopes to report back to council on include an independent power producer at Monmouth Creek and BC Hydro's forecast plans for the 21st century.

The forum, sponsored by BC Hydro, will allow those attending to debate public concerns about environmental and resource development trade-offs and examine alternative energy resource options.

**[4] INTERTIES HUMMING AS HIGHER WATER FILLS NORTHWEST RIVERS; NEW INTERTIE CAPACITY IS SCHEDULED** :: Despite some voltage and operating procedure problems, expanded DC intertie capacity was scheduled this week even before new terminal facilities at both ends of the DC intertie linking the Northwest and California were dedicated at ceremonies Tuesday at Celilo station above the Columbia River in Oregon and at Sylmar north of Los Angeles. Power sales from the Northwest early in the week put the DC intertie as high as 2300 MW and AC-DC combined traffic at more than 5000 MW. There was enough power this week from higher water in regional rivers not just to sell south, but also to lay off a lot of Northwest and California gas and coal generation. **The power supply report is continued in ENERGY MARKETS at [16].**

**[16] ENERGY MARKETS: THE POWER RUNNETH SOUTHWARD AS BEAVER, CENTRALIA, COLSTRIP AND IPP ARE LAID OFF (> from [4])** :: The DC intertie expansion of 1100 MW is a half-again increment over the previous 2000 MW capacity. The expanded capacity came on line just in time for regional run-off from snow-covered US and Canadian mountains in the drainage of the Columbia and Snake Rivers. The Northwest region's hydro system is nearing peak generation capacity and is not only able to fill the three interties almost to capacity, but to lay off gas and coal generation as well in the Northwest.

BPA sources told CLEARING UP that there have been displacements of coal generation in Washington (Centralia and Weyerhaeuser cogen at Longview), Montana (Colstrip 2, 3 and 4 and Corette), Wyoming (Bridger) and Utah (Intermountain Power Project 1 and 2, Hunter, Huntington, Carbon and Naughton). PGE's Beaver combustion turbine, recently fired up for export load because cheap gas was available, was laid off. California layoffs include Olive 2 on tbe Burbank system and PG&E's Moss Landing 6 and 7, Pittsburg 7 and Helms and Castaic pumped storage projects. These displacements were for varying amounts of time and for rates as much as 10 mills lower than standard rates. The displacement and export sales come as the region's nuclear plants, WNP-2 and Trojan, are both down for their annual outages.

**Even before the terminal expansion facilities** were dedicated Tuesday in Oregon and Thursday in California, the new capacity had been scheduled as high as 2100 MW. For a while early in the week, problems with voltage support and operating procedures needed to put the higher capacity where it belongs inhibited scheduling. But by Thursday, Glenn Bjorklund of SoCal Edison told CLEARING UP the only reason that the intertie system was not fuller was a "limit on transactions. It's just a matter of economics now." At mid-afternoon on Thursday, Bjorklund's computer showed the DC intertie at 1900 MW and the two ACs at a total of 3000 MW. PG&E sources said that the DC intertie late in the week was loaded to 2300 MW for a brief period--well into its new capacity. The sources agreed that economics were the only constraining factor keeping the expanded intertie from rising to its current operating maximum of 2990 MW **[Cyrus Noë].**

**[8] BC HYDRO'S SECOND ANNUAL ENERGY FORUM WILL FOCUS ON THE ENVIRONMENT** :: BC Hydro is hosting its second annual Electric Energy Forum--subtitled "Energy and the Environment"--next week at the Hotel Vancouver. The meeting gets underway Wednesday evening with a keynote address on "Sustainable Development" by Maurice Strong, a Canadian member of the United Nations World Commission on Environment and Development. Thursday speakers include Federal Energy Minister Jake Epp, BC Energy Minister Jack Davis and BPA Administrator Jim Jura. Thursday's agenda also includes discussion of BC Hydro's environmental policy and simultaneous workshops on future development scenarios.

Another set of workshops--on proposed environmental guidelines for various kinds of resources--kicks off Friday's session. Public participation is Friday's theme, and a BC Hydro news release noted that the forum represents the first opportunity for public comment on, and discussion of, these environmental guidelines. "The guidelines and this forum reflect our determination to integrate environmental principles into all aspects of planning and operation," Chairman Larry Bell said in the release **[Kari Stout].**

The Sun (Vancouver, B.C.)
MAY 11. 1989

# UN commissioner issues warning

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## Environment 'bankruptcy' possible

**By GLENN BOHN**
**Sun Environment Reporter**

A corporate environmentalist warned Wednesday that humanity's survival is threatened unless it starts to practise "sustainable development."

Maurice Strong, a Canadian on the 23-member United Nations Commission on Environment and Development, said it is a simple concept for anyone who has run a business.

"If you eat up your capital, you'll be heading for bankruptcy," he told a conference sponsored by B.C. Hydro.

He said it was "imperative" that governments, industries and individuals change the way they do business.

Strong said we must have "sustainable development" — which the commission defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

### *No compromise urged*

Strong is a chairman on several corporate boards and a former executive director of the UN environment program. He said we must ensure that our decisions about the exploitation of resources, direction of investment, orientation of technology and institutional change don't compromise future needs.

Strong noted that coal burning creates acid rain and contributes to the "greenhouse effect."

Scientists have discovered increasing levels of greenhouse gases like carbon dioxide in the atmosphere, caused by deforestation and the burning of fossil fuels like coal, oil and gas. Like the glass of a greenhouse, these gases are trapping solar radiation, increasing global temperatures. The commission warned that a temperature rise of only a few degrees will flood low-lying coastal cities, river deltas an farm lands, as well as effect forests crops and fisheries in unknow ways.

### *Hydro questioned*

After the talk, B.C. Hydro chairman Larry Bell read out a few written questions submitted by th audience.

Asked if B.C. Hydro was practisin sustainable development if it wa considering export proposals tha used fossil fuel, instead of non-polluting hydro power generation, Bel said: "I think the key word is 'inviting' (proposals)." He then waited fo Strong's response.

"I can't believe that you're doin that," Strong said with a smile, eliciting chuckles from an audience o several hundred.

Bell said in an interview later tha Hydro was considering thes environment and energy issues a the conference, and the final decision on burning coal for power exports was a decision for the B.C. government.

The Sun (Vancouver, B.C.)
MAY 11. 1989

# Watershed line must meet guidelines, Epp says

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The federal government is not necessarily committed to a full enviromental assessment of the proposed natural gas pipeline's route through the Coquitlam watershed, Federal Energy Minister Jake Epp said today.

But he said the federal government must be satisfied that the pipeline through the watershed meets all environmental guidelines. Epp was speaking to reporters after a speech to B.C. Hydro's second annual electric energy forum.

"The government of Canada is still committed to the Vancouver Island natural gas pipeline and the federal funding remains firm," said Epp.

He said the next move is up to the provincial governement.

"I had a meeting with the Honorable Jack Davis this morning and it was very positive," said Epp.

He said if the provincial government issues a energy project certificate the [illegible]eral government would review the environmental aspects.

The review would take about one month, Epp added, and if the federal government is satisfied it would give the go ahead for the pipeline.

A full federal environmental assessment would take much longer.

Pacific Coast Energy Inc. is proposing to build a $250-million natural gas pipeline to Vancouver Island.

Member municipalities of the Greater Vancouver regional district oppose the route through the watershed.

The Sun (Vancouver, B.C.)

MAY 12 1989

# B.C. Hydro sets environment policy

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By RODNEY NUTT
**Sun Energy Reporter**

The environment, which is shaping up to be the issue of the 1990s, is very much on B.C. Hydro's mind.

The electric utility Thursday made an environmental policy statement and appointed a vice-president for environmental issues.

Hydro chairman Larry Bell said Chris Boatman will assume direct responsibility for environmental matters as vice-president, corporate affairs and the environment.

"This appointment focuses our attention on the environment at the most senior level and reinforces our commitment to environmental protection, one endorsed recently by our board of directors," Bell told Hydro's second electric energy forum in Vancouver.

The resolution passed by Hydro directors states: "In carrying out its business, B.C. Hydro will minimize adverse effects on the natural and social environment and actively pursue opportunities to manage these resources for the benefit of future generations."

But Bell said an organization cannot have an environmental code of ethics imposed upon it by its senior management.

"This is something that demands the active involvement of all our employees and we have commenced a process of consultation and communication that will lead to the introduction of specific guidelines," said Bell.

For example, Boatman told the conference that Hydro will urge its engineering staff to treat wooden poles with organic salts rather than pentachlorophenols in wet areas to avoid leaching of the preservative.

Jim Jura, administrator of the Bonneville Power Administration, said the U.S. electric power generating industry has to face up to the environmental issues.

"Electric utilities are the biggest producers of carbon dioxide which represents half the gas pollutants in the atmosphere," said Jura.

"The challenge that we all face is to avoid putting an unacceptable strain on the environment while at the same time ensuring that Canada's electricity supply system is adequate to meet economic and energy objectives," said federal Energy Minister Jake Epp.

"This means that standards and guidelines must be established to impose environmental norms on electricity generation and transmission," he added. "The courts will have an increasing role interpreting environmental legislation."

Epp predicted Canada would have to double its present electrical generating capacity over the next 25 to 30 years.

"Barring a major new breakthrough, such as the one we may be witnessing with cold nuclear fusion, most of this increase will have to be provided by large conventional sources of generation: hydro, coal or nuclear," said Epp.

Epp said he has asked the National Energy Board to identify measures that would enhance interprovincial electric trade.

Alberni Valley Times
(Port Alberni, B.C.)
MAY 12 1989

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## BILLIONS NEEDED TO MEET DEMAND

B.C. Hydro will have to spend about $4 billion over the next 10 years to meet the province's growing demand for electricity, the Crown corporation said Thursday.

The figures were disclosed in Hydro's latest Resource Plan, released at the second annual Electric Energy Forum being held in Vancouver.

While the figure includes overhead and interest during construction of generating and transmission infrastructure, it doesn't include inflation.

The Sun (Vancouver, B.C.)
MAY 12 1989

# Power demands exceed projections as '80s energy surplus ends for Hydro

For the third consecutive year, power demands in 1988 exceeded B.C. Hydro's projections — signalling the end of the energy surplus that has existed since the early 1980s.

It also means Hydro will require additional energy to meet load growth in the early 1990s, Hydro manager of policy and planning Ken Peterson told an electric energy forum.

In its 20-year resource plan, Hydro predicts electric energy requirements will increase by about 2.3 per cent a year over the next 20 years based on economic growth of three per cent annually and a population growth of 1.4 per cent each year.

Through the year 2000, Hydro will meet its energy requirements through conservation measures, buying electricity from private sector producers and bringing hydroelectric facilities at Keenlyside-Murphy Creek on the Columbia River and at Site C on the Peace River into production.

After the turn of the century, the utility's options include more hydroelectric development, thermal coal power generation and increased conservation.

The Province (Vancouver, B.C.)
MAY 12 1989

# $4b tab for Hydro

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By BRIAN LEWIS
**Business Reporter**

B.C. Hydro will have to spend about $4 billion over the next 10 years to meet our growing demand for electricity.

That's the estimate the Crown corporation revealed yesterday in its new Resource Plan.

The plan — which examines power supply and demand to the year 2008 — says Hydro must spend about $100 million annually on fixed assets (including transmission, stations and communications) until 1992.

Spending would then increase to $600 million annually until 1997.

The $4-billion figure includes overhead and interest during construction of generating facilities, but it doesn't include inflation.

Hydro proposes to use a variety of ways to meet the growing power demand, including saving energy through conservation.

It will buy power from adjoining utilities in Alberta, the U.S. Northwest and Alcan in B.C.'s Northwest. And if necessary, it will build a new hydro plant at Keenleyside and Peace Site C.

A thermal generating plant is also an option.

"The annual demand for electricity in the B.C. Hydro Integrated System is expected to almost double in the next two decades," says the plan.

It also notes that for the third straight year, power demand in 1988 exceeded projections for the B.C. Hydro system.

"This signals the end of an energy surplus that has existed since the early 1980s," the plan says. "It also means that, beginning in the early 1990s, Hydro will require additional energy to meet projected load growth."

However, the document says that — assuming an annual economic growth of three per cent and a population growth of 1.4 per cent a year until 2008 — electricity prices are expected to decline over the next 10 years.

Speaking yesterday at the second annual Electric Energy Forum in Vancouver, B.C. Hydro Chairman Larry Bell told more than 400 delegates from Western Canada, the U.S. Northwest and California that environmental issues are playing a greater role in the electric-utilities sector.

"At this time we face the challenge of balancing the needs of a growing economy with the impacts development has on the environment," he said. "There are no absolutes — just tradeoffs."

Federal Energy Minister Jake Epp told the forum that most of the increasing energy demand in Canada during the next 25 to 30 years will have to be met by large conventional sources such as hydro, coal or nuclear plants.

B.C. Energy Minister Jack Davis noted that B.C. Hydro's rates are among the lowest in North America.

"And this fact generates environmental problems since we use electricity wastefully," he said.

**[2] CANADA: VANCOUVER ISLAND PIPELINE STALLS OUT OVER WATERSHED ISSUE; BC GOVERNMENT REJECTS WEST KOOTENAY POWER'S GAS PLANT ::** Pacific Coast Energy Corp.'s plans to build a natural gas pipeline to serve Vancouver Island have ground to a halt for the moment, despite the BC Utilities Commission's recent recommendation that the provincial government issue an energy project certificate for the line. Energy Minister Jack Davis had been expected to issue the certificate by this week, but a stand-off has developed, with Greater Vancouver Regional District mayors adamantly opposing the pipeline's route, which crosses the Coquitlam watershed. In other news from Canada, the BCUC has turned down West Kootenay Power's application to build a $36 million, 140 MW gas plant in Oliver to provide peaking and back-up power. **The commission had some good news for West Kootenay, however, giving final approval to the company's request for a 6.7 percent rate increase; the Canadian news picks up at [20].**

**[4] SPOTLIGHT IS ON ENVIRONMENTAL ISSUES AT BC HYDRO'S SECOND ANNUAL ELECTRIC ENERGY FORUM ::** BC Hydro Chairman Larry Bell opened the first full day of the second annual Electric Energy Forum--co-sponsored by Hydro and the BC Energy and Environment Ministries--by telling attendees that a major challenge facing the utility lies in "balancing the needs of a growing economy with the impacts development has on the environment." Bell also said that one goal of the forum, which was subtitled "Energy and the Environment," was to gather feedback from participants on the trade-offs that must be made to balance development with environmental concerns. The conference, held Thursday and Friday of the week at the Hotel Vancouver, also featured talks from Federal Energy Minister Jake Epp, BC Energy Minister Jack Davis and BPA Administrator Jim Jura. **Davis said he thinks BC should hang on to its portion of Columbia River Treaty downstream benefits after the current agreement (under which this entitlement is sold to the US) expires in the next decade; read on at [22].**

**[7] CLEARING UP THE POWER SUPPLY NEWS: NONFIRM MARKET IS BOOMING; EXPANDED DC INTERTIE STILL HAS SOME ENGINEERING GLITCHES; IMPROVED STREAMFLOWS BODE WELL FOR RESERVOIR REFILL ::** Bonneville is marketing 3000 to 4000 MWa of nonfirm power daily to Northwest and Southwest buyers, BPA officials said this week; this figure includes 900 MWa sent to BC Hydro. While a number of California utilities are using their full share of capacity on the newly expanded DC Intertie to make purchases from Bonneville and other Northwest utilities, engineering difficulties and what BPA sources termed "economic" problems are still keeping the DC line from being loaded to its full operating capacity of around 3000 MW. High runoff due to warm weather accounts for the abundance of nonfirm power available: April streamflows measured at The Dalles were 120 percent of average, and Northwest Power Pool director Rich Nassief said July 31 reservoir refill may reach 90 percent to 95 percent, given at least average rainfall over the next couple of months. **Jump to ENERGY MARKETS at [17].**

**[17] ENERGY MARKETS :: [High Spring Runoff Due to Warm Weather Means Nonfirm Power Is Filling The Interties] (> from [7])** Northwest Power Pool director Rich Nassief said this week that for the month of April, precipitation measured at The Dalles was 91 percent of normal; for the first nine days of May, BPA operations planning chief Doug Faulkner said, precipitation has been just 71 percent of average. The official May 1 volume forecast for January-July runoff is 98.6 million acre-feet--91 percent of average. While this figure is down slightly from the 99.5 million acre-feet forecast on April 1, Nassief told CLEARING UP that April was the second consecutive month with streamflows measuring 120 percent of median--before this spring, he said, streamflows had not reached even median level for two years.

Warm weather has played a role in the high runoff levels, Nassief said: weighted pool average temperatures were almost 4 percent above normal for the month of April. At the beginning of last month, the coordinated system reservoirs had been 15 percent full; by the end of April, the fill level doubled to 30 percent. Assuming that precipitation is at or above average through July, Nassief said the system should refill to at least 90 percent.

**Faulkner said that BPA is** "operating the system to flood control and the water budget" and is very active in the nonfirm market, sending 3000 to 4000 MWa per day to buyers in both the Northwest and Southwest. BC Hydro, whose reservoirs refill later than those in the US Northwest, figured prominently in these transactions this week, buying 900 MWa: 300 MWa of this is Burrard displacement power; the remainder is being delivered under a recently finalized storage agreement. The storage power will be returned to BPA from July through October, Faulkner said.

Maximum load on the newly expanded DC intertie was at around the same level as last week--about 2300 MW. Faulkner said there have been continuing "engineering and economic" problems that have kept the line from being used to its full operating capacity of about 3000 MW. A number of California utilities--including LADWP, Burbank, Glendale, Pasadena, SoCal Edison and SDG&E--have been using their full share of the line's capacity (at heavy load hours) to make purchases from BPA and other Northwest utilities, he added **[Kari Stout].**

The report points out, however, that "it is clear that the gas turbine proposal, subject to compliance with ... conditions, provides the highest probability of minimizing rate impact on WKP's customers. It is possible that, once the plant is constructed, it may run only infrequently if additional interruptible power can be purchased at attractive rates. Hence it will have served its purpose by reducing the cost of new purchased resources below what they might have been without the gas turbine. From a broader provincial perspective, it could be argued that B.C. Hydro would benefit from the gas turbine by virtue of reduced demand on its resources and deferral of capital projects which in themselves are likely to impact the environment in some way."

**[22] BC HYDRO'S ENERGY FORUM FOCUSES ON WAYS TO MEET CANADA'S GROWTH WHILE MINIMIZING ENVIRONMENTAL IMPACTS (> from [4]) ::** Federal Energy Minister Jake Epp told attendees at BC Hydro's Electric Energy Forum on Thursday that deregulating electricity exports is a high priority of the Canadian government. To that end, he said, regulatory duplication will be reduced, with exports overseen almost entirely at the provincial rather than the federal level. In addition, the term of utilities' export licenses will be extended from 20 to 30 years. These changes will be accomplished through amendments to the National Energy Board Act, Epp noted, adding that the enabling legislation will be introduced soon.

Epp said the government is also considering legislation aimed at reducing adverse environmental effects associated with energy resources. While the government also supports alternate energy and demand side management, Epp said it is "unrealistic" to think these two resources will meet the country's growing energy needs; therefore, Canada must work on ways to reduce emission of pollutants such as sulfur dioxide and nitrogen oxides. A recent agreement with the provinces to cut sulfur dioxide levels in half by 1994 is one step in this process, he told the forum. Epp also pointed to recent steps BC Hydro has taken "to ensure energy development will occur without undue stress on the environment." These include implementing demand side management programs such as "Power Smart"; initiating a process for acquiring generating resources from independent producers; and planning for large power exchanges between Hydro and TransAlta Utilities.

**In the next 25 to 30 years, Canada will have to double** its present generating capacity, Epp said; large conventional resources will be needed to meet this growth. The challenge facing energy policy makers, he said, will be to generate power "without putting unacceptable strain on the environment," and he promised that the government will develop "rigorous guidelines" to ensure adverse environmental effects are minimized as much as possible. Ottawa's approach to balancing energy development and the environment, Epp concluded, is to create a framework in which the utility industry and the government "can cooperate to achieve shared objectives."

In his address to the forum, BC Energy Minister Jack Davis stressed the role the province's hydro-based system has played in ensuring low electricity rates; a disadvantage of cheap power, he noted, is high consumption and "wasteful" energy use. While the province will work to keep domestic rates at just slightly over cost, Davis maintained that exported power must be priced at "market-based" rates. BC has never financed a generating resource for export sale and is just now beginning to look at that possibility, he added. Davis mentioned BC's portion of Columbia River Treaty downstream benefits as being the lowest cost, "cleanest" resource BC has. He indicated he believes the province should not resell its downstream benefit entitlement to the US when the current contract expires in 1998—in contrast to recent statements by Hydro officials that BC may be interested in negotiating such a resale (see CU #358). Davis' comments indicate that the entitlement's future disposition is likely to become a political issue as the termination date of the current agreement draws near.

— **BPA Administrator Jim Jura told the conference that** "the energy interests of the western US are rising to the challenge of meeting their energy needs without adding emissions" to the atmosphere. Conservation and environmental protection must be priorities in planning to meet the region's energy needs, he said, adding that Bonneville has been pursuing a number of strategies along these lines: increasing the efficiency of the present system; "aggressively" pursuing conservation programs; exploring new resources, such as cogeneration, that have "exciting possibilities"; and working to enhance inter-regional and international cooperation to "optimize" use of the system in general and of the Pacific intertie in particular. Jura said "we're making progress" toward overcoming the political and economic obstacles that have hindered optimal use of the system which stretches from the desert Southwest to British Columbia **[Kari Stout]**.

The Free Press (Fernie, B.C.)
MAY 31, 1989

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# Hydro forum addresses environment

B.C. Hydro employees know they have to consider the needs of the environment on a day-to-day basis and are being encouraged to offer suggestions as to how the utility can improve its performance in all areas where there could be an environmental impact.

Opening the second annual three day Energy Forum in Vancouver May 11, Hydro chairman Larry Bell said that no organization can have an enviromental code of ethics imposed upon it by its senior management.

"This is something that demands the active involvement of all our employees and we have commenced a process of consultation and communication that will lead to the introduction of specific guidelines," Bell said.

The forum, jointly sponsored by Hydro and the provincial ministries of Energy and the Environment, has as its theme Energy and the Environment and Bell told more than 400 participants that the theme was chosen because "Hydro recognizes it is a topic of considerable public interest."

"We want to impress upon you that we too are concerned for the environment. We have gone outside the company and hired scientific experts in areas of concern and we intend to deal with issues on a professional and factual basis, not waiting for regulation and public pressure to force us to take action."

As examples, Bell pointed to Hydro's program for the multiple use of reservoirs, to a patented process for the destruction of PCBs in oil and to a vegetation management program. "In all these endeavours we are striving for further improvement." He

See page 6

Free Press (Fernie B.C.)
May 31, 1989

# Hydro focuses on environmen

From page 5

added Hydro was also taking the initiative on the emerging issue of electric and magnetic field effects.

Bell announced Chris Boatman, vice-president of Corporate Affairs, would assume direct responsibility for environmental matters as vice-president Corporate Affairs and the Environment.

"This appointment focuses our attention on the environment at the most senior level and reinforces our commitment to environmental protection, one endorsed recently by our board of directors," he said. Bell noted Boatman would be reviewing Hydro's draft environmental guidelines during the forum and would be asking for comments from those attending the event.

"At this time," he went on, "we face the challenge of balancing the needs of a growing economy with the impacts development has on the environment. Anything is possible but we always have to ask the question 'is it practical?' "

"There are no absolutes — just trade-offs. While we know society is prepared to make the sacrifices of jobs, income and convenience to realize environmental goals, we have to know to what degree." Bell commented, adding "what we expect to receive during this forum is your opinions on these trade-offs."

Referring to Hydro's new PowerSmart program, which was launched a year ago as a demand side management approach to meeting future domestic load growth, Bell said it was already meeting with considerable success.

"This is a 10 year program and we plan to invest $255 million in that time to realize energy savings of 3,000 gigawatt hours. This, in turn, will enable us to defer investment in a new generating plant. In effect it's power at half the cost of a new project."

As an example of how a PowerSmart strategy could have an immediate impact he said that Hydro has replaced all the older fluorescent tubes in its head office building with new and more efficient lights. "This cost us $55,000 and the annual savings are estimated at $44,000. We see this as just one example of the hundreds of similar opportunities that exist for both ou company and our customers,' Bell said.